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ABSTRACT

This publication stems from a project to help teacher educators and other professionals study the Comprehensive Elementary Teacher Education Models (CETEMs) by providing information and promoting future-planning through participant examination of systematic planning techniques. The seven papers included are 1) "Teacher Education and Systems," by Robert B. Howsam; 2) "Designing Changes in Teacher Education Through Future-Planning: The Role of Systems Theory," by Harold G. Shane; 3) "A Scenario of Models, Systems Analysis, and LEARNING Systems," by Walter LeBaron and Judith Klatt; 4) "Systems Analysis in Teacher Education," by James Popham; 5) "Some Considerations upon Entering into New Arrangements for the Preparation of Teachers," by Donald R. Cruickshank; 6) "Variations on a Systems Theme: Comprehensive Reform in Teacher Education," by Bruce R. Joyce; and 7) "Synthesis and Summary," by Donald Haefele. Collectively, these papers reflect stages of thought and of action proposals which teacher educators can use in responding to demands for better programs, sharper professional skills, and deeper knowledge. Related documents are ED 027 068, ED 034 076, ED 041 857, and ED 049 165. (MBM)

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SYSTEMS AND MODELING:
SELF-RENEWAL APPROACHES TO TEACHER EDUCATION

Compiled by Donald Haefele

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FOREWORD

Our society is undergoing an intense period of introspection during which the fabric of our institutions is being tested to determine its responsiveness to demands for innovativeness, relevance, and change. Many areas of education, and particularly teacher education, have engaged in rigorous self-studies in response to pressures from within (students and faculty) and from without (the public).

One strong response in teacher education in recent years was the development of alternative models for preparing elementary teachers. In March 1968, the Bureau of Research (now the National Center for Educational Research and Development), U.S. Office of Education, selected and funded nine of the 80 proposals submitted for the design of Comprehensive Elementary Teacher Education Models (hereafter referred to as the CETEM's or the models).

The U. S. Office of Education model design effort--the Elementary Teacher Education Project (ETEP)--was originally constructed as a three-phase project to stimulate comprehensive change in teacher education by creating future-oriented teacher preparation programs. Phase I involved the development of the models. The nine funded CETEM's were developed by Florida State University; Michigan State University; Northwest Regional Educational Laboratory; Syracuse University; Teachers College, Columbia University; University of Georgia; University of Toledo; University of Massachusetts; and University of Pittsburgh.

Phase II produced eight feasibility studies on costs, resources, and data necessary to implement a model. Of the nine original models funded in Phase I, the University of Pittsburgh and the Teachers College models were not funded in Phase II (for technical reasons unrelated to the value of their models). The University of Wisconsin's model, developed with Phase I USOE support, was added to Phase II, bringing the total of project teams in the second phase to eight. In January 1970, the feasibility studies were completed.

The studies were analyzed to determine their implications for Phase III--projected as a development, implementation, and evaluation phase. The U. S. Office of Education disseminated the feasibility reports. Extensive funding has not been provided to carry out the major objectives of Phase III. At this date the CETEM's continue to be resources for those studying alternatives for preparing teachers, and some implementation of CETEM concepts and approaches has taken place.

This particular publication is an outgrowth of a 1969 Bureau of Research request that the AACTE conduct a project which would help teacher educators and other professionals to study the models. Subsequently, AACTE established a USOE-funded dissemination project to:

1. Provide teacher educators and others with information about the CETEM's.
2. Promote future-planning of teacher education programs through participant examination of systematic planning techniques.

During 1969-70, the Association conducted five regional workshops to disseminate information contained in the CETEM's. The sites were Philadelphia (Temple University), Atlanta (University of Georgia), Kansas City (University of Missouri--Kansas City), San Jose (San Jose State College), and Evanston (National College of Education).

The final report of that project written by Donald Haefele, project coordinator, is entitled "AACTE Project to Disseminate Knowledge and Understanding of the Comprehensive Elementary Teacher Education Models Developed with the Support of the National Center for Educational Research and Development, United States Office of Education." It is available through the ERIC Document Reproduction Service (EDRS) for 65¢ in microfiche form (reader needed) or for $3.29 in hard copy from the ERIC Document Reproduction Service (EDRS), P.O. Drawer O, Bethesda, Maryland 20014, cash needed for orders of $10.00 or less. A related publication available from AACTE is *A Reader's Guide to Comprehensive Proposals for Preparing Elementary Teachers* (1970, 342 pages, $4.00). Dozens of other publications are available from original publishers and from the ERIC Document Reproduction Service, information about which is available from the ERIC Clearinghouse on Teacher Education, One Dupont Circle, Washington, D. C. 20036.

The AACTE is pleased to have played a role in helping the teacher education community become more knowledgeable of these "first generation" program model design efforts. The Association calls attention to the potentialities of analyzing the models' elements and processes and of investigating the feasibility and desirability of incorporating elements and processes on a highly selective basis into current teacher education programs. The CETEM's are a resource for those committed to a systems approach as one of many options open to teacher educators.

The Association acknowledges the efforts of the project staff, the advisory committee, and the people who made presentations and served as resource personnel. Dr. James Steffensen and Miss Shirley Steele, liaison personnel from the U. S. Office of Education, particularly should be recognized for providing leadership for the project.

Project Coordinator was Dr. Donald Haefele, and project co-directors were Drs. Joel L. Burdin and Walter J. Mars, AACTE associate directors. Several other persons on the staff worked diligently to attain project objectives.

Edward C. Pomeroy
Executive Director

December 1971

INTRODUCTION

Donald Haefele

Collectively, these papers reflect stages of thought and of action proposals which teacher educators can use in responding to demands for better programs, sharper professional skills, and deeper knowledge.

In the first paper Robert Howsam, dean of the College of Education at the University of Houston, sketches some fundamentals of systems theory and also asserts the legitimacy of systems application to the resolution of educational problems. Each teacher education institution, states Howsam, should develop a program that is "based on adequate analysis of need and is comprehensive, flexible, and self-correcting. Systems approaches seem to have the greatest capacity to deal with problems of this complexity and magnitude."[1]

Harold Shane, University Professor at Indiana University, supports Howsam's systems application with the concept of future planning.

> In education, most of us have looked upon the future...as having lateral boundaries....I feel that we need to recognize that the future is *not* linear like a straight road, but fan-shaped. The future is made up of the interaction of a wide-ranging group of multiple futures, and we can methodically look at possible *alternative* futures in teacher education, weigh them in terms of values, work toward attaining those we believe are superior, and do our best to make sure that certain ones come true.[2]

He urges teacher educators to use the systems approach in determining alternative futures. The future, notes Shane, is determined by plans we design today.

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[1] Robert Howsam. "Teacher Education and Systems." Keynote speech delivered at the AACTE Dissemination Project Workshop in Atlanta, November, 1969.

[2] Harold Shane. "Designing Changes in Teacher Education Through Future-Planning: The Role of Systems Theory." Keynote speech delivered at the AACTE Dissemination Project Workshop in Kansas City, November, 1969.

Some questions are implied, but intentionally left unanswered in Shane's paper: How can teacher educators employ systems analysis to determine future programs? What is a program model, and what function(s) does it serve in future planning? What steps can teacher educators use to analyze, improve, or create a system? The responses to these questions are left to subsequent papers by Walt LeBaron, a systems consultant, and Judith Klatt, systems analyst associate for the System Development Corporation, and to curriculum planners such as Donald Cruickshank, president of Wheelock College, Boston, Massachusetts.

LeBaron and Klatt are helpful to those who want a deeper exploration of a systems approach as applied to teacher education. Criteria for judging a program model and system constraints are explained. Systems theory and general procedures can be extracted from LeBaron and Klatt's presentation. The authors define and explain six steps in systems analysis:

1. Conceptualizing the system;
2. Defining the "subsystem";
3. Stating the objectives of the system;
4. Developing alternative procedures;
5. Selecting the best alternative;
6. Implementing the system.[3]

How can such theory and procedures produce an improved teacher education program? What steps can program planners pursue to assure emergence of a quality program model and operational program? What decisions will planners have to make along the way? What alternatives exist at the various decision points? In responding to such questions, Cruickshank furnishes a four-stage process for program change. The participant begins at the *need stage* and progresses through *design*, *development*, and *implementation* stages. According to Cruickshank, "During the need stage, the training agency organizes for change and establishes needs and priorities in teacher education curricula. The design stage attempts to identify programmatic thrusts which hypothetically will reduce or eliminate the needs. In the development stage, the training agency seeks to build or adopt new training components and subsystems are instituted and tried out during the implementation stage."[4]

In essence, several people introduce the systems concept, establish a readiness for using systems analysis, present a comprehensive look at systems, and engage the reader in a series of exercises leading into an understanding of how systems procedures are used.

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[3] Walt LeBaron and Judith Klatt. *A Scenario of Models, Systems Analysis, and Learning Systems*, OEC-0-9-569006-3704 (010). Washington, D.C.: U.S. Department of Health, Education, and Welfare, October 1, 1969, pp. 26-32.

[4] Donald R. Cruickshank. "Conceptualizing a Process for Teacher Education Curriculum Development." A paper written for inclusion in this publication, April, 1970.

Supplied with some systems skills and strategies for program model planning and implementation, the teacher educators--maintain Howsam, Shane, LeBaron and Klatt, and Cruickshank--now need alternatives in terms of processes and products. Several questions may arise in the teacher educator's mind at this point: What performance objectives should be included in the program model? What assumptions underlie the choice of objectives? What is the nature of the performance model? How can an efficient management and monitoring system be established? What alternatives related to these tasks are available in the CETEM's? Bruce Joyce, professor of education, Teachers College, Columbia University, responds to these questions in an overview statement on some basic elements of the ten models and alternatives. In an extensive treatment of the *conceptualization of a performance model*--the first and most fundamental task in modeling--Joyce provides a range of approaches (or alternatives) to the task.

This initial conceptualizing or problem defining generates implications for subsequent tasks, statements of need, definitions of the involved subsystems, and delineation of objectives. Although the conceptualization of a performance model is generally the most time-consuming activity, intensive effort at this initial stage can prevent later criticism and waste of resources. Program modeling, hypothesizes Joyce, generally includes six tasks:

1. Development of the performance model;
2. Analysis of the performance model through sets of behavior objectives;
3. Specification of training subsystems;
4. Development of the overall training system;
5. Development of management systems to monitor a large program;
6. Reconciliation of the program and product with the client and the field.[5]

Some tasks resemble those specified by LeBaron and Klatt. The six tasks and the common assumptions Joyce has extracted from the CETEM's furnish *windows* for viewing the models.

In pursuing the program model design steps proposed by LeBaron and Klatt, Cruickshank, or Joyce, teacher educators can discover alternative performance models, assumptions, and components in the paper by James Popham of the

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[5] Bruce R. Joyce. "Variations on a Systems Theme: Comprehensive Reform in Teacher Education." A paper written for inclusion in this publication, May, 1970.

University of California at Los Angeles. Utilization of a mixture of alternatives, some derived by Joyce from the CETEM's, some from other sources such as the *Standards* used by the National Council for Accreditation of Teacher Education,[6] *Teachers for the Real World*,[7] and particularly those alternatives indigenous to his own situation will help the teacher educator to select the optimal model.

These varied sources of alternatives allow program model designers to determine the mixture of alternatives suitable to their needs, relate these alternatives to local demands, and design their own program model.

We now have the processes and methodologies to improve our teacher preparation programs. Systems theory and system application guidelines are now available for investigation and utilization by teacher educators seeking practical techniques and suggestions.

We possess the necessary elements to facilitate the forging of personalized, individualized, relevant, and competency-based teacher preparation programs. The CETEM models are a rich source of alternatives. Paraphrasing Shane, it is now time to consider alternative futures for teacher education from existing possibilities, select those which are superior, and make them work.

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[6] American Association of Colleges for Teacher Education. *Recommended Standards for Teacher Education*. Washington, D.C.: The Association, March, 1970.

[7] B. Othanel Smith, Saul B. Cohen, and Arthur Pearl. *Teachers for the Real World*. Washington, D.C.: American Association of Colleges for Teacher Education, 1969.

TEACHER EDUCATION AND SYSTEMS

Robert B. Howsam

Regardless of how much we know about systemic approaches to problem solving, we do have one thing in common: all of us are concerned about a teacher education program adequate for our times. Undoubtedly we will discover that we differ markedly in our perceptions of the dimensions of the problem involved in reconstituting teacher preparation programs and on our approaches to solving it.

Viewed practically, teacher education is the process of converting educated lay persons into professional teachers. This process can be viewed conceptually as an input--processes--output phenomena, with the main input being trainees (plus other resources necessary for the program) and the output being the professional teacher. The teacher emerges with at least a beginning repertoire of professional knowledge, skill, and behavior. Thereafter, the teacher manages his own continuing professional growth programs.

Clearly, teacher education, like education itself, is not forever the same. Instead, as John Goodlad has indicated, education is intended to bring people into possession of their culture and thus is a function of *time and place*. Teacher education can be no less.

Recent observers have pointed out that teacher education has little changed over the decades and, further, that it is woefully inadequate.

These same decades have seen phenomenal changes in society. A rapidly advancing technology has triggered massive alterations in almost every aspect of life. The *place* has changed markedly with developments over remarkably short periods of *time*. Although slow to respond, the public education systems have been making some adjustments. Prospects are that an educational revolution may be in the making. But, with rare exceptions, teacher education programs continue without significant modification.

A systems theorist would make disturbing predictions on the basis of such evidence as just presented. He would point out that organisms or organizations which fail to adapt to changing conditions do not survive. The systems theorist would point out also that changes in one part of a social system inevitably lead to changes in all of the other *adaptable parts* of the system. As an objective observer he probably would not care whether any particular social institution survived or not. On the other hand he might be expected to advise that we study our time and our place and provide for its needs if we wish continuance of social approval and support.

One of the major problems of the teaching profession is that it has never been firmly established in the mind of citizen or teacher alike that teaching is a *serious activity, requiring a level of preparation comparable to other professions*. Teaching continues to be viewed more as art and craft and less as clinical or applied science. Its knowledge, behavior, and skill have long been seen widely diffused among the educated members of the society. Thus a minor and unimportant role has been assigned to teacher education. This condition will change significantly only when the profession is able to convince itself and its publics that *how to teach* and *what to teach* are different dimensions of the teaching role, that possession of the requisite knowledge of subject matter content in no way predicts ability to manage learning activities, and that understanding learners and managing their learning opportunities is a matter for highly educated professionals.

It should be kept clearly in mind that changes in a society involving values, knowledges, and behaviors learned in such primary institutions as home, school, church, and community are the most difficult to effect. Much easier to change are behaviors learned later in life in second level institutions such as colleges and institutions. Thus, leaving out questions of technical complexity, it can be asserted that changing the behavior of a citizen to that of a doctor will encounter relatively little resistance in the person. Changing the behaviors of a person from the culturally learned patterns of teaching to those of a professional teacher will be much more difficult.

The need for professional teachers becomes clearer and clearer with each passing year and each new educational confrontation and crisis. Dissatisfaction with the competence of teachers to deal effectively with learning problems--which all recognize--mounts steadily. The training of teachers has yet to respond meaningfully.

When it does respond, the teaching profession--and teacher education in particular--will confront many issues as it attempts to revise the *processes* of its programs. Some random but perhaps representative questions include:

1. Given projected rates of social and technological change, for what kinds of educational institutions are teachers to be prepared? Will there continue to be schools as we know them? If so, how will they be organized and how will they function?

2. What different roles will teachers play in educational institutions and activities? How will electronic technology impact these roles? For example, to what extent will mediated teaching modify the traditional classroom teacher's role?

3. Is it the role of the teacher educational institution to promote educational developments? How does it choose among alternatives?

4. What knowledge will the teacher need in order to perform his role?

5. How best can the training institutions arrange for these learnings?

6. In place of or in addition to those learned in the general culture, what behaviors and skills will the teacher need?

7. Keeping in mind the predictable resistance to change, what processes can be devised that will accomplish behavioral change in desired directions?

8. What provisions should be made for identification with and induction to the teaching profession?

9. A professional faces a lifetime of re-education and updating. What provision for this is needed and what is the role of each of the professional entities involved?

10. When teaching is clearly defined as a profession rather than as a discipline, what will be the appropriate status of teacher education on the university or college campus? What will be its relation to other units on campus?

11. Since expectations of teacher behaviors are so deeply rooted in the general culture, what will need to be done to update this image?

12. Is it the role of teacher education to serve society or to lead it? A teacher preparation program exists on a campus dedicated to the search for valid knowledge and to promoting its use. The teacher, on the other hand, is a socializing agent in the service to the community and state. In times of rapid change conventional wisdom tends to persist in the face

of valid knowledge which appears to contradict it. What does the teacher education institution prepare the teacher to do when confronted by this tendency within himself and in others with whom he deals?

Questions such as these serve mainly to demonstrate the complexity of the existing situation and the necessity of arriving at at least tentative answers before programs of preparation can be devised.

In truth, the situation is so complex and so in flux that no single comprehensive viable and defensible solution can be expected. The processes to be used must be based on the best knowledge available. They must, at the same time, be held as tentative and inadequate. The only reasonable course of action, therefore, is a program that is based on adequate analysis of need and is comprehensive, flexible, and self correcting.

Systems approaches seem to have the greatest capacity to deal with problems of this complexity and magnitude. For this reason in part, and in part because systems approaches were widely used in the Elementary Teacher Education Models Project and in other recent efforts to restructure teacher education, in the remainder of this paper I should like to attend to the general concept of systems.

Systems Approaches

Earlier I disavowed qualifications for speaking on the assigned topic. I did so because I make no pretense of being an authority on systems analysis or systems construction. If I have any purpose in being here, it is to encourage all of us to believe that *systems is a way of looking at things as well as a technology*. One can use systems concepts in an effort to understand reality without the additional knowledge and skill needed for systems engineering or for reconstructing reality. Many people reject the idea of systems for education on the grounds that education does not lend itself to the application of technology. This is a legitimately debatable point. It is not legitimate, however, to refuse to use systems concepts in examining education as an important social phenomenon.

I personally have come to the conclusion that systems is by far the most productive conceptual approach available at the present time. For me it is as significant with reference to planning as the scientific method is with respect to research. It represents a tremendous forward step.

Teacher educators should know it well since it is functional in conceptualizing and planning. Perhaps of equal or greater importance, however, is the fact that systems is an important part of modern life. If it is useful to the teacher educator it will be no less useful to the teacher who confronts the children of a systems-oriented world.

"Systems theory," like all good basic theory, is a very simple notion with great utility. It is being used by modern physical and social scientists, by business men, by architects and builders, by the military, and by the space conquest missions among others. Indeed, it is claimed that *everything that exists can be at least partly described in systems terms.*

Daniel Griffiths says, "A system is a complex of elements in mutual interaction." Other definitions are similar though not always as simply stated. Here the two essential characteristics are shown as *being a number of parts* with the parts exercising influence on or *interacting* with each other.

Banghart[1] quotes a definition which states that "a system is a group of interdependent elements acting together to accomplish a predetermined purpose." Here the important element of purpose is added.

The idea of systems is not new; it is part of the common lexicon of our culture. We speak of all kinds of systems and we use the term with considerable accuracy. For example, from childhood on we talk of:

- Solar or galactic systems;
- Transportation systems;
- Ignition or fuel systems in cars;
- Heating or cooling systems in homes;
- Circulatory or respiratory systems;
- Social systems among groups of humans.

In each case there is a complex of parts, one affected by the other, working together for a common purpose or task. One has no trouble recognizing many different kinds of systems.

Another characteristic of systems is that they have *outside limits or boundaries*. Systems are identified by drawing an imaginary boundary around the parts which are seen as related. For example, it is useful to describe a school system and to draw a boundary between it and its community even though no such neat line really exists.

Every system except the very smallest is composed of subsystems. For example, a school system has schools which in turn have classes and groups and individuals within the classes. A human system is composed of a number of subsystems such as the nervous and circulatory systems.

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[1] Frank W. Banghart. *Educational Systems Analysis* (New York: The Macmillan Company, 1969), p. 25.

Similarly, all systems except the very largest have suprasystems of which they are a part. For the classroom system the school is a suprasystem. For the individual school the school district is a suprasystem.

The term "system" is applied to the level under consideration at the moment. At other times that level may be a sub- or supra-system.

All systems have similar properties and behave according to the same rules. Some of these properties include:

1. Open systems *exchange energy and information with their environments*. These are called *inputs* and *outputs*.

2. Systems tend to maintain themselves in a *steady state* or in a state of *dynamic equilibrium*. Essentially this means maintaining a balance between and among its parts. The word "dynamic" indicates an ability to change relationships but the word "equilibrium" indicates a stable tendency. Thus, it is normal for systems to resist change.

3. Systems have a tendency to *entropy*, which means that they have a tendency to disorder and inertia. That is, they tend to degenerate over time.

A central concept in systems theory is that of *feedback*. This is the process of returning output to the system as inputs by means of feedback loops. In effect this is the control mechanism which permits knowledge of results and subsequent adaptation so that purposes are achieved and balance is maintained.

Not only is internal feedback needed, however. Feedback from the environment also is important, particularly in social systems. The teacher education program that fails to monitor the opinions of those who hire its teachers is likely to be in trouble, particularly if employing systems have much choice of candidates.

Effective use of feedback tends to counter the tendency to entropy and thus keep the system dynamic and effective.

Systems are changed by inputs either to the system itself or to its subsystems. When done by a change agent, the inputs are termed *interventions*. Multiple interventions are much more likely to bring about change than are single efforts. This is because the old equilibrium is likely to be destroyed, thus forcing a new structure or patterns of behavior.

Systems analysts and systems engineers use their knowledge of systems in analyzing existing systems, in changing systems, and in engineering systems. Regardless of the complexity of the problem--whether engineering systems to place men on the moon or setting up a micro-teaching situation--the same basic principles and approaches are used. The objectives are identified and very clearly specified. The system and its needed elements are identified. For each subsystem the inputs, processes, and assessment of outputs are determined. The output is monitored and the results fed back so that the system may correct its own deficiencies. Coordination of the sub-systems is provided by the system.

It is this kind of approach which is being recommended here for the design and testing of teacher education programs. To some at least what has been presented may appear as simple and so logical that it needs no amplification. Some may even see it as the way we have always done things. There is great danger in this. Indeed, the tendency for those of us who represent an older generation to see emerging ideas in terms of the reality of our generation and to miss its relevance probably constitutes our greatest problem.

Although thinking in systems terms is not new, it is not common. It is not the way people in our society look at reality. For centuries we have viewed change in *linear* rather than *systemic* terms. The slow pace of change which has characterized most of our past permitted us to view change as a chain or sequence of events; our culture transmitted this view of reality. Folksayings such as "one step at a time" or "slow and steady wins the race" reveal the value system as well as the reality perception. Similarly, patience with the anticipated slow pace of improvement was buttressed by religion and culture. Patience was taught to be a virtue.

There is no more certain way to retard change than by imposing linear and additive views upon it. The effect is to permit change inputs only slowly and one at a time. Thus the equilibrium of the system is little disturbed. Instead of establishing a new level or kind of equilibrium the system readily returns to its earlier steady state.

For many of us our habitual behavior is to view events in linear terms. To change this perception to a systemic, interactive view of reality is difficult indeed.

In any event, as we approach experiences, we might hope for a personal system that is open to inputs from the conference environment; a learning process within us that will yield the desired outcomes; and a self-monitoring feedback system that will counteract any tendency to entropy which is within us individually.

DESIGNING CHANGES IN TEACHER EDUCATION THROUGH FUTURE-PLANNING: THE ROLE OF SYSTEMS THEORY

Harold G. Shane

In man's remote past, education was a necessary process for the survival of the race when our ancestors existed in small human clusters in Europe, on the flood plains of the Yangtze Valley, or lived around the once-fertile shores of Lake Chad. Education thus insured that the younger generation survived in a world made hostile by an inimical nature; a nature of unmediated climates, unfathomed diseases, and dangerous beasts. We have moved from this to a new era, where we are facing the need to focus on education for survival in a world made dangerous by man's folly, by his abuse of the biosphere, and by his inability to live effectively with himself.

Many of you read about the difficulties man faces. John Fisher, in a recent article in *Harpers Magazine*, spoke of four great problems of our era:

°Our ability to wipe ourselves out in a world made hostile to man by man,
°Our proliferating problems due to garbage and waste,
°The danger of pollution and the need for general conservation, and
°The pressing problems of over-population.

It is in the context of these four urgent challenges to human courage, ingenuity, and self-direction that I would like to turn to the topic "Designing Changes in Teacher Education Through Future-Planning: The Role of Systems Theory."

Future Planning and Systems Theory in Education

First, let me focus on the concept of future-planning. Three or four years ago, Mrs. Shane* and I became interested in finding ways--methodically, intelligently and scientifically--to approach changes in the education of teachers. We asked ourselves "How can we help (or help design) the future so that educational changes come about in more desirable ways?" In asking the question we felt that tradition, prejudice, authority (in the sense of blindly accepted external direction), just plain inertia, pressure groups, and one-dimensional research have given us a bad situation in teacher preparation. After considerable indecision, in 1963, we elected to use a form of systems approach to the future-planning of teacher education. This was in the Indiana University INSITE project which received an AACTE award in 1968.

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*Dr. June Grant Shane, Professor of Education, Indiana University

We saw that most persons who did planning in teacher education, conceived of the future as *linear*. They looked at the way they approached changes in teacher education in the same way a man might look at a map showing the route to Omaha or Denver. He would look at the map and envision a road unrolling ahead of him. He would decide, particularly if he has a lot of youngsters in the car, that he would allow for rest-stops, have lunch at a given place, and so on. In short he saw this road as something that he *had* to follow to get to where he was going. He saw the route from Omaha to Denver as a *linear* kind of thing.

In education, most of us have looked upon the future in the same way. We have looked upon it as having lateral boundaries; in other words, we construed tomorrow to be a ribbon of highway lying ahead of us. I feel that we need to recognize that the future is *not* linear; rather than a straight road it is fan-shaped, made up of the interaction of a wide-ranging group of multiple futures. We can methodically look at possible *alternative* futures in teacher education, weigh them in the light of our values, work toward attaining those we believe are superior, and do our best to make sure that certain ones come true. In other words, instead of waiting for tomorrow to come, we need to recognize that tomorrow is dynamic and creative and will become what we *make* it. In the last analysis, the best proof that we can create tomorrow is "today" because *today is what we made it yesterday* through the decisions that shaped our present world.

You can, through a systems theory approach, mediate and choose from among promising alternative futures. Consider some of the processes we speak of as "system theory." Systems theory concerns itself with (1) conceptualizing the components of a "universe" or cluster of factors to be studied; (2) defining various subsystems within this unit; (3) identifying and assessing objectives of a given system of the subsystems; (4) developing alternate procedures in the dynamic quest for better tomorrows; (5) selecting what seem to be the best alternative procedures; and (6) identifying means for implementing the decisions reached.

During the early 1940's the U. S. devised a form of operations research as an approach to wartime planning. Pragmatically, the military forces tried to decide how we best could handle things like military landings and bombings on the basis of the six steps listed above. By the fifties, a sophisticated approach to mediating tomorrow by understanding and shaping it today was underway as some corporations were investing millions in applied systems theory.

There are distinct values to planning methodically. Such use of systems theory in teacher education gives you a broad overview of the kinds of things with which you are dealing. It leads to the organization and articulation of component parts of the academic and sometimes unrealistic world in which we work to educate teachers. It encourages the wise development of resources. It helps recognize how the participants *themselves* can change through the process of participating. It gives us, in a sense, the "nuts and bolts" needed for long-range planning.

Systems theory makes a major contribution to the process of *asking the right questions*. But it is through the human processes of participation in an educational systems approach that we pursue *the right questions to lead to the best possible answers*. It is in this context that I would like to suggest five areas in which we need to stretch the rim of our vision as we attempt to anticipate the probable world of the mid-1970's. It seems altogether probable in the seventies that we will need to provide for:

1. Changing policies in education;
2. New practicies in the schools;
3. Organizational changes and innovations;
4. Mediating influences of technology;
5. Impact of biochemical research with a bearing on learning.

Under these headings one may organize some of his thoughts in the process of making reasonable conjectures about tomorrow--conjectures based on projections about the changing of teacher education practices.

Changing Policies. First of all, we are likely to see tremendous new priorities appear in early childhood education, priorities that may extend downward to at least the two-year-old level. At present the education of younger children is a field in which we are doing virtually nothing to educate teachers. For the last several generations, our expenditures for education have been shaped like an inverted pyramid. The largest portion of our educational funds has been spent on adolescents. This spending has tapered off until finally, at the primary level, it was very limited, and in the pre-primary years there was virtually nothing spent on the two-to-five year olds, except in economically priviledged districts. By the end of the seventies, this pyramidal structure probably will be even broader at the top. But instead of tapering off in the childhood and early childhood period, spending at what we now call the preschool level could account for our largest single percapita educational expenditure.

The question of how we can most wisely invest funds in early childhood will call for a great deal of research. More research is needed also in regard to the question of the age or level of development at which some form of planned schooling might begin. Some educational leaders like child psychologist Ira J. Gordon probably would advance the idea that the school's interest in the child might well begin before birth with parental education.

Other changing policies might be the discontinuation of rigid school entrance-age policies, further refinement of team teaching, basic five-year preparation for beginning teachers, increased specialization of both elementary and secondary teachers for teaching teams, more flexible certification to permit teachers to work with a wider age-range of students including adults, and more interchange of both teachers and students between school systems in the U. S. and overseas.

New Policies Suggesting New Practices in the Schools. Professionally prepared persons will inevitably have wider opportunities in the public education structure after 1975 because of greater diversification in staffing policies, and we probably can expect more diversity in teacher preparation programs. One recent analysis of personnel needs, for instance, suggests that there may be as many as 93 new types of assignments and jobs in education by the 1980's--jobs for which we're not now preparing teachers. Representative of these could be the chemotherapist, an expert in the use of various kinds of biochemical intervention for improving, or at least changing, the minds, the moods, and the memories of children.

Another practice likely to emerge in the seventies may well be program development based on more thoughtful approaches to the significance of subculture group membership. The influence of one's culture was pointed out by E. T. Hall in *The Silent Language,* and its follow-up, *The Hidden Dimension.* Because of membership in given subcultures which have shaped their perceptions, Hall contends, humans see and hear in "different" ways and respond accordingly to a given stimulus. We can expect to find distinct organizational changes in teacher education which encourage greater awareness of the need to teach each child in the context of *his* culture. As Hall points out, a Spaniard and an American do not see the same bullfight in Madrid because they belong to different cultures. While the Spaniard "sees" the panoply, and the tradition, the matadors, and the picadors, the American is likely to "see" the sorry fate of the bull.

One further practice is closely related to subculture group membership: replacing *compensatory* education with *supportive* education. In other words, by 1975, we may not merely say "What can we do to make up for deprivation?"

We may ask, "What can we do to maximize cultural differences between the American Negro, Puerto Ricans, and other groups in order to influence how one learns 'best'?" Harvard professor Gerald Lesser and certain of his associates there suggest that, at least in some respects, each culture group learns better in certain instructional contexts than in others because of cultural memberships.

Organizational Innovations. What is likely to happen to our conventional patterns of school organization? In the seventies, if you judge by some of the ideas now current, we will move beyond mongrading, a useful concept advocated by such persons as John Goodlad and Robert H. Anderson in the late fifties and sixties. We will move toward accepting a seamless concept for curricula--a continuum, in which, instead of having grade levels (or upgraded groups to encompass children at three or four different age levels) we will reach the logical conclusion that grading--in the sense of all six-year-olds being in the first grade--is nonsense and move toward the idea of perceiving 50 million or more people in our schools (and in various alternatives to formal schools) as moving along personalized instructional paths--each as distinct as the 50 million wires in a large cable like the one supporting San Francisco Golden Gate Bridge. Personalized and uniquely identifying experiences, hopefully, will give the same strength to American democracy that each wire helps to give to the cable supporting that bridge.

We will create a true continuum which will begin with planned school contacts with two-year-olds which, by the end of the seventies, may be known as the "nonschool preschool" period. Perhaps this type of program should begin with actual school-sponsored experiences for two-year-olds. School contact might begin with physical examinations, sociological studies, and other analagous contacts because, after a child reaches five, the permanent scars of a broken home or cruel treatment have had their effects.

In early childhood we are also likely to find a "minischool" for three-year-olds as an increasingly common part of public education. Indeed, one of our needs involves the launching of massive longitudinal studies of the kinds of experiences that children in the two-to-five year range should have. At present there is no real consensus as to either the nature of the programs that are desirable for young learners or the preparation of their teachers.

Continuing to look ahead in school organization, I can conceive of a "preprimary continuum," following the minischool. This would not be a conventional four and five year old kindergarten, but an unbroken period in which children might spend from one to three, or even four, years before moving into the primary continuum in which we now place six-to-eight year olds. For example, Spanish-speaking children of our Southwest many of whom often are not formally introduced to English until they enter the primary grades, might spend an extra six-to-twelve month period improving their language skills in this preprimary block of time before moving into the primary continuum.

If we project the concepts of a seamless continuum of personalized learning experience upward through the years of public education, I would not be surprised to find young people 10 to 20 years hence graduating from our secondary schools with an education equivalent to or better than what we now associate with the B.A. degree. With sound experiential input in early childhood on which to build there is no reason why high school cannot produce students in the 1980's who are capable of functioning as well as the university undergraduates of the early 1970's.

It also seems to make sense to organize teacher preparation so that public education can begin to meet the educational needs of adults. We undoubtedly will need programs in adult education to serve citizens who, in their forties and fifties, come back to study, to re-educate themselves socially, economically, and politically, for a rapidly changing and frequently confusing world in which they will, presumably, live longer and have much more leisure time. We will, by the mid-1980's need teacher education programs for men and women working with much older students than are now enrolled in the U. S. schools.

We are also likely to have a "derived curriculum," based upon the individual needs of persons of virtually all ages. (We may wish to call this the "paracurriculum," as distinguished from a narrow concept of the curriculum as subject matter *per se* in order to take into account a wide-ranging group of factors that may influence the input of learning experiences in the near future.)

In the possible educational world of which I am speaking, it is quite likely that we can devise programs from which there will no longer be drop-outs; because, if we have schools that remain open throughout the year, if we have persons moving at individualized rates, it doesn't matter whether a student is off campus for three weeks in winter or three months in the summer. By the same token, through imaginative deployment of staff, teachers should be enabled to disengage themselves from instructional duties at any given time rather than just during three summer months.

For the drop-out, it will not necessarily be the end of the road. The high school student, instead of dropping out at, say, the middle of his junior year, would simply move laterally from the school curriculum into the paracurriculum which life provides and continue his education with the cooperation of the school, industry, or other employers, his counselors, and his parents. Within a personalized lifelong curriculum he can, when he chooses, return later to his formal schooling. It might be a week later if he found he didn't like a job he has taken at a filling station; it could be a year or more. But his personal direction of lifelong learning experiences will no longer be considered an interruption if he discontinues formal schooling; he will no longer carry the stigma of a drop-out; and he will be part of a out-of-formal-school concept of education extending throughout life.

Another feature of this concept could be that remedial work would no longer exist since remediation isn't needed if one moves at his own rate. Special education, too, could be abolished. *All* education would be "special," not just what society provides for the deaf, partially sighted, or birth-injured. In this same context, formal report cards become obsolete and pupil progress becomes a methodical spot-check that can be made at any time rather than at six or eight week intervals as is now generally the case.

Prospects for Technological Changes in Influencing Education. What about technology as more and more schools gradually become "media-mediated" in the seventies and eighties? Through technology in the ninties, the school as it existed in the 1970's may no longer exist at all.

William H. Kilpatrick, in *Education for a Changing Civilization* (1926), pointed out that home, church, and community were once the basic sources of a person's education and formal schooling was a mere adjunct. In 1840 students often went to school for as little as six weeks in a year and received their "real" preparation for life as they plowed in the fields, worked in the home, or participated in community life. Reading, writing, and ciphering were useful adjuncts to learning. Perhaps in the 1980's we will come full cycle once again, and the educative experiences will have the same impact on the lives of the young that society had a century and a half ago when a fourth or fifth grade education was a terminal one for most of the population.

The entire human unit of the school may become a part of this future, with the school environment becoming media and the community becoming a teaching aid in the education process.

We may find in most of our 1980 schools the kind of service centers Bruce Joyce describes in his interesting monograph, *Man, Media, and Machines*,[1] in which various service or resource agencies are carefully built to serve the school by facilitating new approaches in serving the young. As this happens, the teacher begins to see himself as a part of a much larger total educational structure. In short, he may become more of an educational clinician and coordinator. By the 1980's perhaps we can begin to think of the teacher, media, and machines as a kind of "cyborg." Cyborg is a medical term which refers to persons who are supplemented or backstopped by various kinds of mechanical devices. In a decade or two we may conceive of teachers as "extended" through technology: persons who work a three hour pupil-group contact day rather than a five or six contact day. The remainder of their time, on a personalized basis, would be used with children and youth in developing personalized programs.

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[1] R. Bruce Joyce. The Teacher and His Staff: Man, Media, and Machines. Washington, D. C.: The National Education Association, Project on Instruction, 1967.

The Challenge of Educational Biofutures. Let us consider a fifth and final challenge--the impact of the bio-future and its possible direct and indirect implications for teacher preparation. Four years ago, I dropped in at the Universite' de Geneve to visit Jean Piaget, the distinguished psychologist. We talked for an hour before his class began. Just before he went off to lecture, I asked him this: if he had 40 years of work to invest in his profession, how would he direct his career during these years?[2] "I would begin to look into the ways in which biochemistry will effect learning," said the precise Frenchman. This was about 1965 and I had no clear idea as to what Professor Piaget was talking about. I made a mental note of his comment, however, since he has been well ahead of his time in much of his thinking.

I have since learned of laboratory research which suggests possible adaptations of findings in biochemistry to improve learning by increasing the power of concentration, reducing distraction, and similar areas. It has been possible, according to a Florida experiment, to improve the memories of some old people who had reached the point where they no longer could remember how to play bridge or checkers. Through chemistry it was possible to restore their faded memories so they could go back enjoying checkers or bridge in the sunshine.

At the present time, most developments in the field of biochemistry have been tried out in institutions for persons with emotional or other problems or in work with infrahuman subjects. There is the distinct likelihood, however, that types of biochemical intervention may prove feasible with children who have learning problems--including those caused by dietary deficits.

In the late 1960's, work by psychologist David Krech captured widespread attention with its suggestion that we may be able to create what we measure as intelligence by intervening in the environments for human subjects as well as mice. Krech, in his University of California laboratories, took 30 pair of mice siblings, twin brothers from different litters, and put one mouse in one group in an "enriched" mouse environment and another group of mice in an "impoverished" environment. The enriched environment offered the opportunity to associate with other mice, security of adult fondling, various kinds of mazes to run, and other stimulation. The "underprivileged" mice were ignored, provided merely with unlimited food and water. They were kept in dimly lit, quiet areas that provided little sensory input.

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[2] Originally reported in Harold G. Shane. "Old Fabrics and New Patterns in Education Overseas," The Phi Delta Kappan. March, 1966.

After the mice were 105 days old, and after about 90 days of mediation tactics, Krech and his associates examined the mice on the autopsy table and found that the number of glia or memory cells in the privileged mice had increased significantly. The diameter of the blood vessels feeding the brain also had become larger. Finally, the weight of the brains of the "advantaged" rodents had increased, the changes ranging from about 6 to 14 percent more than in the case of the low sensory input mice. It is provocative to think about the possible conclusion that, through enriched experiences, mind potential might be created or stimulated. The implications of this research for persons in various culture groups and in various underprivileged areas suggest the importance of carefully designed, enriched learning experience from an early age. The research also may have concommitant significance for how we prepare teachers. Doubtless changes in teacher preparation of the late 1970's will include at least some radically different *methods* at the university level and changes in the *content* of what is emphasized.

Conclusion

In the systems approach we have been talking about, in applying a systems theory approach to the education of teachers, we have not only the need to ask the "right" questions, but also a great personal responsibility in pursuing the right answers to how the profession can best marshall itself to do the job. For example, what model of man or woman do we want to hold up to our children? Do we also threaten the child with the danger of manipulation? Or have we tended to wait too passively for ways in which we could move into the future?

In the present period of hedonism, a period of changing standards, what kinds of "maps" do we want to draw up in teacher education to help us to chart the new social and educational terrain of the 1970's and 1980's.

An old friend and I were chatting the other day, and we got to talking about what the world would be like if the world's three billion people numbered but a thousand. In this thousand-man world, we concluded there would be about seven hundred people who were either disinterested in or actively opposed to what we think of as the values in the American life and culture--values reflecting the Western-European, Judeo-Christian traditions. There also would be about 300 persons who were likely to respect many of these traditions. In the total of 1,000 persons, we would have 70 to 80 Russians and about 60 persons residing in the 50 United States. Of these 60 Americans (about six percent of the population, yet producing and consuming perhaps 60 percent of the world's goods), about half are either too old or too young, or otherwise not active in providing services and in producing material goods. Of the remaining 30, perhaps 20 would be involved in family rearing and other home activities, leaving us with perhaps 10 persons, out of a thousand-man world, representing the individuals who are producing a large share of the world's ideas and goods. Of these 10, about one probably is in the professional leadership category. *You* are in that category as teacher educators.

It is to leadership groups, that we must look for the redirection of teacher education and comparable changes of importance to society in preparing our youth for meaningful adult participation in tomorrow's interesting, but troubled world.

A SCENARIO OF MODELS, SYSTEMS ANALYSIS, AND LEARNING SYSTEMS

Walt LeBaron and Judith Klatt

The Comprehensive Elementary Teacher Education Models represented a "first cut" in the redesign of teacher education. Indeed, such an effort would have been impossible a few years ago because the development of total program designs required new skills and knowledge about the parts. The next challenge required the organizing of these educational improvements around new and sometimes radical approaches to program development.

These ten elementary teacher education projects developed a group of program models *but not* model programs. The distinction is not merely one of playing with language. A *model program* suggests an ideal concept to serve as an example to others. Indeed, these projects may do just that, but it is not their primary intention. A *program model* has as its purpose the organizing of parts, functions, and processes into a meaningful format for analysis and understanding. These elementary teacher education models are important examples of how programs can be organized for effective presentation. A model in this context is a representation of a whole, a total universe.

A model attempts to explain a complex organization or process by comparison or analogy with a commonly understood and less complex phenomenon. All models try to describe a complex reality by analogy with a simple and familiar set of concepts. As models are constructed, they tend to become *prescriptive* as well as *descriptive*. People come to accept the model as the true description of how things are. In this case, it becomes necessary to reexamine the assumptions underlying the model and to redefine the significant factors in the description attempted by the model. This task, of course, underlies the purpose of these elementary teacher education models.

What makes a good model? In this day and age, there is a strong preference for models which describe the *information processes* within a universe of concern, but all types of models have certain characteristics by which their value can be judged.

1. *The Model Is Complete*. Most models fail to be useful because they do not explain the whole system. Educational planning has been particularly guilty in this respect. School operating units are sometimes totally separated from the designers and producers of materials, and both remain apart from the colleges and universities producing the teachers. Small wonder, then, that many new teachers are unprepared to cope with the realities of the classroom.

To be complete, a model for teacher education must trace the process from the student's entry through his initial years of teaching. In other words, it would include both preservice and in-service components in a common structure. The model would also describe the linkages between the college of education or teacher education program, as a system, and other parts of the total system of education. The flow of information and resources among these systems would be described, and the areas of independent and cooperative action would be indicated.

2. *The Model Reflects an Operational Reality*. When six blind men described the whole elephant in terms of their experience with a part, they were reacting in much the same way most persons describe the field of education. It is, of course, only human nature to reflect a personal bias based on experience and learning, but sometimes this range of perception prevents a necessary reconceptualization of problem areas--changes in behavior to meet changes in conditions.

John MacDonald points to some conceptions of teaching which prevent a confrontation with operational reality. He suggests first that, by viewing the teacher as both an idealistic hero figure and a person trapped in a predetermined system of values, a productive description of teaching is blocked. No hero can operate in a carefully circumscribed environment. The second block to an effective view of the teacher's role has been the concept of the "teacher as generalist," an omniscient renaissance man surviving in an age of overspecialization. The tenacity with which this view of teaching is upheld has prevented necessary attention to describing the tasks and activities of teaching, consequently limiting the kind of information necessary for the construction of adequate models.

Perhaps no single model, or set of models, can achieve a completely adequate description of teaching; but any model should permit a realistic confrontation with reality.

3. *The Model Is Understandable.* A model is understandable if it describes a universe in a straight-forward manner and if it shows a relation between its concerns and the next larger universe. A teacher education model, for instance, would be related to both a model of the total university and the educational system which consumes its products.

4. *The Model Encourages Analysis.* Until recently, education has lacked general analytical models. Educators have been locked-in by buildings, content organization, and confusion over aims and goals. We have lost sight of the process of education because we have replaced it with a concern for the institution. Education models have become descriptions of structures rather than of operations. These kinds of models fail to encourage the kind of analyses which facilitate basic understanding. Indeed, they tend to become circular: they seek self-improvement based on traditional assumptions instead of questioning basic purposes.

5. *The Model Encourages Feedback.* Effective models must be responsive to the information from their operation and from their environment. This process is called *feedback*. Feedback implies that information collected is used in some way to affect the operation of the system. In other words, information from the operation is fed back into the system.

Feedback systems impose several requirements on the design and execution of a model. An effective feedback system is designed and implemented at the beginning of a process. Information about the inputs and the environment are collected, and statements of goals and purposes are formulated. At critical points throughout the operation of the system, and at designated concluding points, output information is collected for comparison with the original data. In this way, the effectiveness and the efficiency of the system can be measured; adjustments can be made in the system's operation.

Traditional teacher education programs have been especially weak in feedback. Lacking a clear-cut purpose, the program generally has produced a young teacher who is liberally educated and who has been exposed to some aspects of teaching--usually from a distance. The relation of these training experiences to the real world of teaching remains unclear, but adjustments are difficult because no feedback system exists to control the the system. In this case, data from the teacher (and the school district) to the institution preparing the teachers, are needed in a form to encourage program adjustments. One important contribution of the elementary teacher education models is a direct involvement with local districts as feedback mechanisms.

A Brief Description of Systems Theory

The word *system* indicates a *process*. In briefest form, "systems analysis" is an orderly process for, first, defining and describing a universe of interest (and the significant factors and their interrelationships within the universe); and, second, determining what changes in the universe will cause a desired effect. Systems analysis generally begins with the broadest statement of the universe, then isolates and defines parts of the system according to their *functions*, and next notes the interrelationships among these functions.

There are different approaches to the description of systems. The following, among many, will be appropriate for the present review.

Subsystem Description

A subsystem is an *operational entity* within a system capable of functioning independently or of permitting independent design and analysis. Critical factors in the selection of subsystems include, first, the explication of a major *process* within the system, and second, a clearly understood relationship between the operation of the subsystem and the goals of the system.

In the field of education, it is possible to suggest a number of viewpoints for the selection of subsystems. Some of these might include:

- A Hardware Subsystem including production, transmission, reception and related equipments, software, and service.

- A Curriculum Subsystem (subject matter organized longitudinally, throughout the school experience).

- A Management Subsystem of students and programs.

Each of the elementary teacher education models organized a unique set of subsystems for developing a program of teacher education, but they share several major elements. The process of curriculum planning and development has received considerable emphasis. In most instances, management subsystems were developed. These included the management of the student (i.e., entry profiles, achievement information, and proficiency standards). Separate subsystems for the production of materials, the procurement of professional staff, and the provision of buildings and equipment were not usually developed. This is justified because these areas, while important to the larger universe of the school of education (or other unit), are not major emphases in the development of an elementary teacher education program. This program uses the end-product of these other subsystems; and, by specifying its requirements, the program can then request these other subsystems to produce the desired products.

An Input-Output Model

Input-output models for educational planning are receiving considerable attention. These models begin by describing the desired outcomes of the system and then determining the changes necessary to achieve these outputs. For instance, in planning a program of teacher education, one would be required in program entrants to achieve this end-product. Inputs to the system would also include the necessary staff and other resources required to operate the program.

An input-output model in teacher education would be useful only to the degree that a relationship between this "picture" of the teacher and the program of preparation could be shown and that feedback procedures could be implemented to govern the process. This, in turn, implies that knowledge of the objectives is the first requirement of system design and evaluation.

The "Heuristic" Approach

This third aspect of system theory is more complicated than the preceding two, but it is most useful when the specific nature of the product cannot be clearly stated.

The critical aspect of this concept is the use of principles to guide action. In planning teacher education programs, principles concerning the nature of the teacher's role, the conditions of operating, the functions of teaching, and the personal characteristics of the teacher would be explicated as a basis for program design.

At present, much of the specific information for designing programs based on heuristic analysis is unavailable. Research has not been concerned with this kind of paradigm. The challenge, however, should be obvious. If programs of teacher education (including the provision of other educational personnel) can be related to the effects these teachers will have on children, exciting and productive program planning will result.

Constraints on Systems Planning

The design of any system is limited by many factors, some of them negotiable, but many of them beyond the control of the systems designer. In deciding which factors fit which category in the planning of programs of teacher education, the following constraints are significant.

1. *Time*. We are required to educate a teacher in four years or less, or perhaps five, if the master's program is included, it is easy to conjecture programs which take less time, either because of a reevaluation of educational

requirements or through increased efficiency in the training process. The models have contributed greatly to this discussion. They have also considered the apportioning of time among required areas of study, experience, and on-the-job practice. In a similar manner the close relationship between preservice and in-service training has contributed to an understanding of the time factor in teacher training.

2. *Information*. Perhaps the major constraint on the design of elementary teacher education programs is available data. We simply do not possess adequate information in a number of areas, especially the relationship between a teacher's behavior and a student's learning, to adequately design programs. Using present information in the designing of the models, we have pinpointed many of these gaps and suggested new and significant areas of research in teacher education.

3. *The Scope of the System*. The broader the initial concept of the system, the stronger will be the design of any sub-universe. For example, a major weakness of teaching has been the inability of the classroom teacher to get beyond the four walls of the room and to interact with other colleagues. This condition contributes to a narrowing of vision and an inability to view the process of education as continuous. At a larger level of analogy than that of the classroom in the school, education in general operates on three distinct subsystems: the local school district, the university which produces teachers, and the "industry" which produces materials. Little direct communication and even less joint planning has existed among these groups. Indeed, interaction has often been considered undesirable. The models have carefully examined some of these relationships and are moving to increase both the scope of the system--the broad view--and the potential interactions among the constituent parts.

4. *Communications*. Any system is constrained by the inability of the parts to communicate with each other and by its inability to communicate with other systems. For instance, the relationships between teacher education programs and the other parts of the university are sometimes counterproductive. Some school systems have developed operational linkages with many universities, industries, educational organizations, and other groups. Through this process of extending communications channels, the concept of the system and the program of education are extended beyond the limits of the school.

5. *Integration*. If the system of educating elementary teachers results in a product which is unable to function in harmony with teachers trained through other systems, communication will be limited and friction will result. The process of obviating this difficulty is called integration. It requires that the designers of a system--regardless of how complete that system is--be aware of that system's ability to mesh with other systems. The models have been aware of the need to relate the program of teacher preparation to the realities of the changing school and culture.

6. *Facilities.* So frequently one hears "Design the program, then build the building." What usually happens is that the program is constrained by the pre-existing building. Facilities too frequently control decisions. Sometimes a pre-existing building makes little real difference; but on occasion, it can determine the success of the program. The location of activities can play an important part in the nature and quality of an experience. Watching pupils in a classroom--actually taking part in the activities--can result in perceptions quite different from observing a movie in a college lecture hall.

7. *Resources.* Resources are of many types to a systems analyst. The most obvious one is money. Others might include: teacher time, student time, equipment, space, expertise, information, and other institutions. The list of potential resources can be quite long. Frequently, systems operate without considering the broad number of resources available to them; without recognizing these resources form bases for designing alternative systems to conserve the use of the *critical resources.* Generally, in education, we have assumed that the student's time was the least valuable resource; but if we plan programs to make effective use of this time, it becomes a critical resource itself.

Constraints on Teacher Education Programs

These constraints can apply to the design of any educational program. In the field of teacher education, several specific constraints can be mentioned. Some of these define the limits of potential programs because they can be modified only within fixed limits. Indeed, changing them requires changing our perceptions of teachers in some radical ways.

1. *Certification Requirements.* Much progress has been made towards establishing uniform certification and towards focusing the proficiency measures on the teacher education institution. The state still sets the standards, but the college certifies that graduates of its programs have met these standards. It may be conjectured that other avenues of entrance, among them the new careers profiles, offer viable alternatives to the four-year undergraduate program.

2. *Local and State Personnel Policies.* Personnel policies are established to govern the behavior of individuals within complex organizations. Usually, these large institutions require some form of structure to promote their purposes, but personnel policies sometimes vitiate against the kinds of individuals who can make a positive contribution. For instance, how many persons choose not to teach because of policies against certain codes of behavior or various ethnic customs? Again, the schools have become

increasingly liberal, or at least sensitive to individual differences; but these policies still exert a strong pressure on the acculturation aspects of teacher education programs. *Adjusting to the realities of teaching* rather than *developing the person as a teacher* too frequently governs the design of programs. The models have done much to examine these problems and to resolve this inherent conflict by providing a number of alternative experiences and career lines.

3. *Individual School Administrators.* The building administrator is usually free to rule within his four walls and football field as much as he sees fit. His style of leadership will determine both the tone of the school and the quality of the education. He usually selects teachers with whom he feels he can work well. While this management technique appears reasonable, it can serve to prevent diversity and to limit the kinds of experiences available to students. In terms of models, it can mean that some schools will not find the new breed of teacher acceptable. For this kind of reason, no doubt, we find several of the models advancing the concept of "portal school": a specific school within a district which will serve as a bridge between the college and the world of teaching.

4. *Parents Anticipations.* To a considerable extent, teacher behavior is limited by the anticipations of parents. Frequently, effective teaching methods and styles must not be used because the community does not find them acceptable. In particular, the disparity between teacher behavior, as considered desirable by parents, and the kinds of behavior which meet the child on his own level, can cause conflict for the teacher. Unless a program of public relations is carefully developed, new forms of organization for teaching--teacher aides, clerical assistance, team teaching--will be met with criticism, usually well meant, out of concern for the child. Preparation programs are pressured by these constraints, especially when they try to adopt unilateral models of teaching to appease pressure groups.

5. *The Profession.* The teaching profession, at best highly conservative and inbred, fears radical departures from present practices, but a new breed of teacher--militant, liberal and action-oriented--is coming to the fore. Present teacher activism concerns itself with pay and prestige rather than with problems of change and education; however, little progress could have been made in American education without an organized profession of teachers. Regardless of the stance, and there are many to choose from, the profession--through its several agencies and organizations--advises, directs, and censures many practices in teacher education. In one respect, a profession is, by definition, an inhibitor of change. Those who are "in" will keep others out, until the "outs" come to look like the "ins." This professionalism

is as much an unconscious phenomena as a direct threat to programs of preparation. The models, having sensed these problems, have worked with the organized professional groups and with teachers' associations in local districts. Nevertheless, the stance accepted by the professional groups interacting with a program of teacher preparation will, in large part, affect the ability of that program to achieve its goals.

6. *The Teacher Candidates.* Teacher education programs must be responsive to the persons who apply for admittance. The ten models have set reasonable admittance standards, and they have envisioned attractive programs. It seems reasonable to expect that they will attract desirable candidates. Working with local districts should do much to improve the retention of graduates. These are encouraging signs.

The Importance of Information

Systems analysis is based on information. Systems theory evolved as an information-oriented decision-making process. In this respect, systems designs are based on the requirements for getting and organizing information. Four kinds of information are usually specified: *input, output, process,* and *environment*. In basic terms, this concept wants to know what the student looks like when he enters the program and how he is different when he leaves.

The systems analyst, as he looks at the process of teacher education, would be concerned with selecting an approach and explicating the constraints. To aid him in this process, he might ask himself the following questions:

- What are the functions and tasks of teachers in the context of the school environment?
- What do we want the teacher to do in the learning environment?
- What knowledge and skills are required in order to perform these functions and tasks?
- What experiences would reinforce that knowledge and give the prospective teacher the chance to practice the tasks?
- How can this analysis of functions and concomitant knowledge and experiences be stated in terms of program goals?
- How could a program of teacher preparation be organized to achieve these goals?

These questions then suggest a number of program construction guidelines--heuristics--which can be reasonably applied to the design procedure. The following guidelines are merely generalizations. Each person designing a model would need to restate the question in terms of his operating environment and program goals:

1. All program experience should come from statements of goals and should be related to these goals.

2. All program experiences should provide a thoroughness and understanding of the basic concepts of the subject under consideration, including the ability to discover and to apply this knowledge.

3. All program experience should be designed for effective presentation, including the maximum of student activity, utilizing the modes known or generally assumed to be most effective for presentation.

4. All program experiences should be designed for maximum efficiency in presentation, based upon preservation of the critical resource, which, in this case, is assumed to be student time.

5. All program experiences should utilize measures of cost effectiveness in development and presentation as long as cost effectiveness does not require sacrifice of the critical resource, student time.

6. All programs should be organized sequentially, as much as this is possible, to include attention to individual cognitive styles, prior background and experience, and special learning difficulties.

7. All programs should be designed to provide a constant system of feedback: first, to the student on his progress and standing; second, to the teacher on the success of the particular program; and third, to the institution on the relation of the particular program to the total program of teacher preparation.

A Step-By-Step Procedure

There are six steps in the process of systems analysis. Each step requires its own group of techniques and suggests a different set of problems and limitations.

Step One: *Conceptualizing the System or the "Problem Universe"*

The first step develops a clear statement of the system of concern. This definition includes all those elements which are a part of the problem universe. The analysis also sets limits to the problem by separating the system from its environment and by relating it to other distinct systems.

A useful and productive analysis is distinguished by the formulation or design of the problem, the selection of appropriate objectives, the definition of the relevant and important environment or situation in which to test alternatives, the provision of reliable cost data, and other pertinent information.

Step Two: *Defining the Subsystem*

A subsystem is an operational entity within a system capable of functioning independently while contributing to the realization of the goals of the larger system.

Step Three: *Stating the Objectives of the System*

The critical point in understanding or using system procedures rests on the importance of clearly explicating the objectives of the system. Indeed, every element within a system is evaluated in terms of one basic question: Does it contribute effectively to the achievement of system goals? A mechanism for determining the objectives of the system, for ranking multiple objectives, and for choosing between incompatible objectives is a first requisite for effective systems planning.

Systems Objectives in Teacher Education. The preceding discussion has provided a process for determining the objectives of a teacher education program and has indicated some of the difficulties in achieving adequate statements of aims and goals. Two guidelines, however, remain to be mentioned:

1. A model should state an alternative series of objectives on the profiles of individual students.

The present models have been especially responsive to this aim. Much of the information handling problem has been solved through the design and implementation of computer information and guidance systems. Most modules provide for individual pretest and post-test and remediation based on individual needs. However, the statements of objectives for each individual should be directly related to the broad objectives for the program and this can be achieved through the development of a carefully controlled evaluated process.

2. The process of explicating objectives should remain flexible and responsive to changing patterns of teaching and learning.

This consideration is really a reminder that the systems procedures are a constantly reiterative process. One does not state objectives and then pass on to the next steps in the process. Both changes in the environment and measurements from the operation of the process will affect the statement and ordering of objectives. It appears highly desirable that a continuing review process be established for determining the value of the objectives and the ability of the processes to meet them. Otherwise, even a carefully designed program will atrophy.

Although the whole of teacher education cannot be explicated and quantified, because the whole of teaching (as an art) somehow defies analysis, the systematic planning of many experiences can still be undertaken.

Step Four: *Developing Alternative Procedures*

Once the goals for the system have been established, the system designers will explore the various alternatives available to them for the accomplishment of the goals. Alternatives may be designed to utilize various kinds of resources (especially cost levels) to indicate different career paths based on variations in entry profiles, and to develop operating relationships which are necessary for implementing new technologies.

As alternative procedures are designed, it is important to predict the consequences of selecting one alternative over another when this is possible. For instance, what are the implications for the total system of the program based on the student's time as the critical resource? What will be the differences in appreciation for the subject if it is learned through a series of programmed instructional units rather than in a group situation? Each program designer should conjecture both the positive and negative consequences of decisions about alternatives.

Step Five: *Selecting the Best Alternative*

The selection of the best alternative depends upon inherent values of the community, the school, and the future. At this point, the philosophical orientation of the decision-maker becomes relevant.

Teacher education is faced with some real dilemmas. We conjecture that an academic major-minor provides the appropriate "general education" program for an elementary teacher. In fact, we assume that a college of education is the best place to train teachers and we structure programs based on these assumptions. It is not the present intention to question the value of these assumptions; rather, by pointing to them, we may simply recognize that our *assumptions* govern our planning and selecting of programs.

Among the assumptions underlying the construction of these elementary teacher education models are positive attitudes towards the use of systems analysis, positive planning for the future, and the value of behaviorism. On a broad level, it is also assumed that teaching, as a process, can be understood (at least in part) and trained for by the models. The models also assume the necessity for total program designs (rather than further changes in the parts), if an adequate view of the future is to be achieved. In short, the models project an inherent faith in the use of the humanistic and scientific goals of education. These assumptions appear valid, but the results of their application to operational programs will be the true measure of their value.

Step Six: *Implementing the System*

An important aspect of implementation concerns the ability of the institutions to accept new systems. Some universities and colleges of education are unable to make the necessary adjustments; others, seeing the need for change, have undertaken programs to examine the ways and means. Florida confined its model to the sphere of control exercised by the school of education. This decision was based on the realities of the campus and will make it possible to increase involvement. Michigan State, on the other hand, incorporated all the college experiences of its teacher candidates, including academic and general course work. Each model coped with the present situation and pointed to steps necessary for involving the remainder of the university.

A Total Design Process

The design of an operational system represents only one aspect of a total design process. Frequently, however, systems analysts and educators alike assume that they have dealt with the whole process when the design is completed. The result has been many magnificently engineered systems which fail to achieve their goals.

There are three elements in a total design process. The first is the conceptualization and design of the operating system which we have discussed. The second is a careful analysis of the environment in which that system is going to operate. The third element is a change and implementation process which will prepare the environment to accept the new system. Each of these three elements has been discussed at great length over the past years, but only infrequently are relationships among them considered.

The elementary teacher education models have sought to achieve total design processes by involving local school districts, industrial groups, and teacher organizations. They have also carefully studied the future roles of the teacher in the schools of tomorrow and have stated their concern for educating a teacher who can work in the present and the evolving institution. These elements are extremely important for the success of the models, along with an implementation process which finds them acceptable in the university or college. In this respect, implied in systems design is a concern for the specific situation; and each school of education considering the models, therefore, will need to consider all the elements in the design process.

SYSTEMS ANALYSIS IN TEACHER EDUCATION

James Popham

In Anthony Oettinger's favorably received book, *Run Computer Run*, he takes some fairly solid swings at a variety of things in education. One of the particular new technologies which he treats in some detail is systems analysis. I thought it might be appropriate to quote Oettinger at some length because I find myself in sympathy with what he says. In his look at analysis, he remarks the following:

> "...At least three conditions must be satisfied for the systems approach to be more than an apt metaphor: (1) The system being studied must be independent among the systems which combine with it to form a suprasystem for interaction among these systems to be either satisfactorily accounted for or else ignored without dire consequences. (2) The system being studied must be one for which well-defined and proved research and design tools exist. (3) When designing a system, we must know explicitly what it is for."[1]

I would like to return to these three conditions later to see what extent teacher education satisfies them.

I believe there is a very useful role for systems analysis in teacher education; and I tend to agree that, in general, it is in our application of the scientific (or rational) method in the solution of problems. I would like to describe in a somewhat personal vein how I, perhaps primitively, became enamoured with systems analysis in teacher education. I was never really convinced that I wanted to be a teacher myself until I was a senior in a small liberal arts school in Oregon. I had been a philosophy major until I realized that philosophy majors did not seem to be making fantastic salaries. I sought a profession that would utilize my history and language arts courses as well as provide a good income. I knew that I could, perhaps, get a teaching credential. I expected them to chastise me for being so tardy; but, instead, they were apologetic and pointed out that they had failed to appoint my incipient interest in education, and they were indeed at fault. They mapped out a program where, within a year, I could get a teaching credential plus a master's degree. Since I had made the decision to become a teacher, I was very serious about wanting to acquire the skills that went with the profession. I knew that shortly thereafter I would have to student teach and actually be a real live teacher.

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[1] Anthony G. Oettinger. *Run Computer Run*. Massachusetts: The Harvard University Press, 1969, pp. 53-55.

When I began taking courses in the teacher education sequence, I was anxious to learn. The introductory course was one entitled "Principles of American Secondary Education," and although I am sure there are such principles, they were not altogether apparent in that particular course. The course was taught by a man with no experiences in public schools. He was terribly skilled at sketching a normal curve. This was not a talent to be underestimated, because one can come into a room, sketch a beautiful bell-shaped normal curve and talk about the characteristics of American secondary youth arranged in this normal fashion. There were precisely enough characteristics to get one through a whole semester without saying anything in general to the task of teaching.

The second course I took was one in educational psychology which appeared to be relevant. It was taught by a man with much experience, but all of it in the animal laboratory. We learned about the neurotic behavior of albino rats. The class seemed to have only a mild bearing on the probable decisions that I would be facing as a teacher. We studied Ebbinghaus and his list of nonsense syllables at length. Nothing seemed to be saying anything to me about teaching, and I was becoming genuinely concerned.

There was only one course in the general methods of instruction. It was taught by a man with a great deal of public school experience, all of it on the Indian reservations of eastern Oregon. Had it been my intention to work with young Indian students, no doubt the course would have packed a great deal of punch. As it was, it lacked relevance. I sensed immediately that it would have somewhat of a minority group orientation; and after several weeks, I knew that the course had essentially nothing to say.

The point I want to make is that I left the entire teacher education sequence at that small liberal arts school not one bit more prepared to teach than when I started. I was desperate to learn how to play the game. Fortunately, when I got into student teaching, my master teacher was an excellent one; and after a month or so of fumbling around, I finally found that I enjoyed the profession very much. When I got into my first teaching job, I looked back at teacher education which, for me at least, had been a travesty and a farce. I thought, perhaps, it had been the fault of my small liberal arts school but when I talked to my fellow teachers, I found that their experiences had been essentially the same as mine. My lack of preparation was a thing that haunted me; so as soon as possible, I went to graduate school to try to learn more about teacher education. It seemed that many people were experiencing state-required course programs which did not provide them with the most respectable collection of skills.

After a few years of graduate school and a couple of different teaching jobs, I received an invitation to go to UCLA to teach a course in instructional methodology which was the precise course that I had found so impractical in my own teacher education experiences. I had to decide what I could do to increase the prospective secondary teacher's instructional proficiency.

It seemed there was only one thing I could do, and that was to increase the students' capacity to make effective instructional decisions. If one can get a person to approach the decision-making task with a different orientation from the one he had before, it might be possible to get more mileage out of him. Having decided to focus on that particular aspect, I operated on one general assumption: *that the primary reason a teacher is in a classroom is to change learners*. It is a fairly obvious assertion, that, no matter how skillful the lectures, no matter how precise the discussion leader, if the students leave the course essentially unchanged, then the teacher has not succeeded. If it is true that your focus is on modifying the behavior of learners, then it seems to me, that you can build some kind of a decision-making scheme around the kinds of changes you want to occur in those learners. It seemed reasonable that if one was going to work with prospective or in-service teachers, it was inappropriate to cover every possible thing they had to learn about teaching. It was far better to take something very modern in terms of scope and give the prospective teacher enough familiarity with it so that he could use it effectively and efficiently.

The first thing I wanted students to do was to specify their objectives in operational terms. I was convinced that, if the focus was on modified learning behavior, one should be able to find out whether the behavior had indeed been modified. I became an ardent proponent of behaviorally stated objectives for a period of time. If I had to do it over again, I am sure I would change that particular phrasing. There is something in the term which is dehumanizing and mechanizing; it tends to turn people off. Now, I would call it something like measurable objectives for the subjective. While at UCLA, I had some bumper stickers made up which said, "Help Stamp Out Non-Behavioral Objectives!". When I ran out of these, I had a second set made up, but without the exclamation mark, which indicates my position had become more moderate as I tested my ideas.

I am calling all of this to attention because I think it is a key component of a system of a model. I do not see how one can make any progress at all until he starts specifying his objectives in operational terms. What I tried to do for my students was to work out the measures to see wheter or not they were developing satisfactory facilities with respect to objectives. All sorts of dividends can be gained from objectives. When one reveals his objectives to the students, some interesting dividends result. The students tend to focus their instructional enterprise on relevant tasks and do not spend their time trying to "psych you out" because they know on what they are going to be tested. Since they know what is being promoted, they seem to have a coercieve effect upon the teacher. When I first began to use these approaches, I had an introductory course in programmed instructions, with about 18 objectives for the course; all stated in very operational terms. I told the students at the beginning, "These will be the objectives for the course. You may modify them as we proceed, but as it stands now, these are the 18 objectives of the course." This plan worked fairly well until about midway when I found an occasion to relate a mildly humorous story. When I finished the story and the laughter had subsided, one fellow in the class inquired, "Please, Professor Popham, indicate to which of the course's eighteen objectives your last ten minutes of remarks was directed." That was the start of the student uprising as far as I was concerned. It was a very dramatic lesson for me because I discovered that people were paying attention to me. The students knew what the goals were, and they did constrain me to behave in the future. If I wanted to behave privily, at least I knew when I was doing it and I did it frankly. One of the greatest things about specifying objectives is the tendency it has to reduce the irrelevance of the senior course. I saw the vast gaps between what I was doing and what was needed.

Any number of instructional techniques may be used. One of the things we have discovered over the years is that there is no single instructional procedure which is invariably associated with the learner's attainment of the objectives. If one attempts to be more specific by using a particular instructor, a particular set of learners, and a particular set of goals, then maybe he can make some assertions about what will work. What we do is offer some high probability principles, but suggest that one test whether or not the objectives have been achieved. Unachieved objectives generally are viewed as reflecting inadequacies in instruction. I have tried to develop in my students a very healthy guilt complex about unachieved objectives. When the goals are not realized, I want them to say first that the deficiency in their instructional procedures was due to deficiency in the procedures themselves rather than a deficiency in their students.

The first possible cause of deficiency is in the instruction, so I teach my students that they must either look back to the quality of their method of instruction to see if there was a deficiency or, if their objective was achieved, then they must look back to the original selection of those particular goals. This is the particular model that I have chosen. I think, at a primitive level, it reflects a systems analyst's approach. He suggests the use of specified criteria and tries to make the system work to achieve the criteria. As far as my students are concerned, I have measurable objectives for each of these points, which permit me to try to maximize the effectiveness of my course. Over a period of time, we have become better at achieving particular objectives, and students have done better in class. I used to take some satisfaction in having high standards. At a college where I taught in the midwest, I would take my grades over to the registrar's office with a fair number of D's and F's. I would fling them down gallantly on the desk and then walk out with a kind of halo over my head. Now, I have corrected some of the flaws, and the course is getting better because students know what is expected of them. I have a vast proportion of A's and B's. The idea is that with this system analysis approach, it seems possible to get students to think as I believe a systems analyst would want them to think.

Let's look again at Oettinger's three criteria and see the extent we satisfy them in teacher education. The first of these, in order for the system analysis approach to be more than an apt metaphor, is that the systems must be relatively isolatable. In general, teacher education does satisfy this particular condition. While it is true that we are certainly concerned with all sorts of relationships, with other elements of the system, this factor is one of the concerns of the models project. One can study it, one can modify certain elements of it, and one can control it; thus, one can study this as a system which is distinguishable.

The second condition is that the system being studied must be one for which developed and proven research and design tools exist. In the area of research techniques, it is possible to distinguish between the kinds of designs and research designs that are suitable for studying the various systems we have. One might classify these in the same ways as Scribben and make the distinction between formative and summative evaluation techniques. In summative evaluation you try to contrast things to see which are better; in formative evaluation procedures you try to improve these things. In the area of summative evaluation research tools, we seem to have sufficient skills in design. In the area of formative evaluation, designs to make our systems function better are very deficient. Those people, like Stufflebeam, who have recently been studying evaluation processes, have pointed out some of these deficiencies in our repertoire of design methodologies. This is particularly apparent in the case of measurable procedures, where in trying to measure the impact of programs in teacher education, we find marked deficiencies in what are known as criterion reference measurement strategies. One distinguishes between norm reference approaches and criterion reference approaches to measurements on the bases of their general purposes. A norm reference procedure is designed to spread people out, to show how one individual performs in relationship to other individuals on a predicted measurable device. Criterion references are designed to show how an individual performs in relation to a given performance standard, irrespective of how other people perform. Standardized tests (an achievement test for example, the classical kinds of tests that most of us have been working with over the years) are norm reference approaches which simply try to tell whether an individual has achieved a given level of proficiency, as in this particular model. I want to find out whether my people can design instructional procedures that work--to find out whether the objectives have been achieved, irrespective of how many people can achieve them. Our technology for developing a criterion reference measure is almost nonexistent. We cannot use norm reference tactics for constructing and improving instruments. Consequently, in that important area--measuring the efficacy of our system--we are really deficient. For example, when you start using the criterion reference approach to instruction and a criterion reference measurement scheme where you are simply trying to measure your objective, you start getting some very strange results from applying classical kinds of analytic techniques. If one uses internal consistency reliability estimates on a test where most people are scoring well, he gets some strange results.

I used to always run the standard kinds of tests in my classes, like the Kudir Richardson Internal Consistency Estimates. I got not only reliability coefficients which were lower than the point eighty or ninety (which I always thought were good), but I received negative reliability coefficients and that was disconcerting. One cannot use these techniques because as their performances become more and more successful and more and more homogeneous, one does not have the variability; and if there is no variability, one cannot use the classical kinds of correlation techniques. This means that the classic approaches we have employed simply cannot function.

In the design tool area that Oettinger speaks of we are deficient. What technology do we currently have to design and develop tools which would be really useful in making a system function? In the monograph *Teachers for the Real World,* B.O. Smith makes, what seems to me, to be the most eloquent plea for the production of instructional training material for use in teacher education. He points out how deplorable our current state is in respect to the existence of such training tools; how impossible it is for teachers to do a good job when, indeed, we have to contrive everything ourselves; how, in other arenas, one of the marks of progress is the existence of a repertoire of tools which can be used to help the practitioner perform better than the nonpractitioner. We do not have the repertoire of tools, and we do not even have the design technology to develop them. We are in a terribly naive state when it comes to the technology of developing instructional products. One of the places in which most of the prominent activity has occurred is the Southwest Regional Laboratory in Englewood. The Southwest Regional Laboratory has tried to expend some energy on codifying the techniques used to develop instructional materials and the kinds of tools which we will need to have to make systems function efficiently. Having been closely associated with this enterprise, my impression is that they are no further along than they were two or three years ago. Essentially, the technology of development is extremely primitive, and on Oettinger's second condition, it seems to me that we are in some trouble.

Oettinger's third condition is that the system should have a clearly defined objective. In this case, I think the existence of the models program gives us a marked advantage. For the first time, a number of leaders in the field are attempting to specify the outcomes of their instructional programs and their teacher education programs with the kind of precision that would permit subsequent measurements. I think this is extremely gratifying. I would hope, however, that these goals for which teacher education enterprises are designed would be recognized as enroute rather than as terminal objectives. It seems to me that the primary defensible objective of any teacher education program must be to produce teachers who are more skilled at modifying the behavior of their learners than those who have not undergone such a teacher education program. That would be my criterion of teaching proficiency--the ability to bring about desirable changes in learners. The components of the model would have to be tested when using that particular theme. Those behaviors would have to be tested against the more ultimate criterion of whether or not teachers can be produced who can change learners.

We have conducted some research at UCLA in the past year or so, operating on the assumption that the good teacher would be one who could modify learner behavior. We have tried to develop some performance tests in teaching proficiency. I remember sitting with Evan Keysler one day trying to decide how we would find out whether our program was worth anything. We had some evidence that we could modify the behavior of teachers at UCLA. People who had gone through this particular kind of program were indeed behaving differently in the classroom, but we did not have any evidence as to whether or not that modified behavior made a difference in modifying the behavior of secondary students. We had not taken the second step. Evan and I speculated about how this might be done. We said that it was neither valid nor fair to contrast teachers with disparate objectives. I began thinking about what would happen if we could give them the same objectives and ask them to teach those objectives, using any techniques they wanted, as long as the criteria objectives remained constant. It seemed like a very reasonable approach. We solicited support from the Office of Education and got a grant to develop a so-called performance test of teaching proficiency. In brief, the tests provided participating teachers with a set of highly measurable instructional objectives and resource materials for about a two-week period of instruction. Their students were pre-tested and post-tested on measures drawn explicitly from the measurable objectives to which the teachers had access. The index of the teacher's proficiency was the ability of learners to grow toward the objectives.

At that time, I assumed the test would show that teachers would be able to outperform the ordinary man-off-the-street. However, the teachers were no more capable of modifying the behavior of learners toward prespecified objectives than were the housewives, TV repairmen, and mechanics. Obviously, my assumption was incorrect. In the first place, we do not prepare teachers to be behavior modifiers, and we certainly do not reinforce them as such once they are teaching. Unless our systems approaches, whatever they happen to be, can produce teachers who can markedly outperform people off the street--people who have not been trained in those improved teacher education programs--we ought to close up shop. I do not believe that closing up shop is the answer. I think that we can clearly develop a cadre of teachers who are eminently more skillful at accomplishing a prespecified objective than people off the street. In order to do so, we have to provide them with tangible skills, which the emergence of this model project does.

There are also a few perils with respect to systems analysis. These are the systems analysts themselves. There are some purveyors of the systems analysis approaches who are, I believe quite frankly, charlatans. They offer not only a vastly increased repertoire of system analysis jargon, but also an incredible, almost unceasing, flow of flow charts. I think you have to be leery of people like that. I am not saying that anyone who uses a flow chart is being destructive, but there are some people who think, because they can use the language, can draw the lines with the arrows, and know what diagrams mean that they are engaging in system analysis. Be careful that you find people who are more than just jargon types.

In a past issue of *Phi Delta Kappan*, I had a short article in which I resented the fact that in America there is so much preoccupation with the instructional process--a means orientation which I think should not be adopted. An outcomes orientation seems to me to be epitomized by the systems approach where one has a tangible criterion against which one pits his energy. In the article, I suggested that there are two very subversive consequences of employing the systems approach. The first of these is that it's one devil of a lot of work. It is far more difficult, far more onerous, to devise criterion measures to tell you whether or not you have accomplished your goal than it is to walk into a classroom and behave the way most of us would like. It is easier to ask yourself what you'll do today than how you'll measure what you've done. We must be ready to accept that very difficult responsibility.

The second danger comes with instructional accountability--to have to say what one is going to do and then be obliged to produce it. I quote my article, because of the eloquence of the prose:

> The accountability for instructional growth that is absent in means-oriented education is awesome, particularly for the incompetent. If one's responsibility ceased with the generation of instructional procedures, then there is no fear. The merits of the procedures will not be measured. One simply conjures up new ways of teaching people, then forgets it--or at most collects some impressionistic data from biased participants. Did the experimental teachers really like the new instructional method (with which they are clearly identified)? How did the "experimental pupils" respond to the new approach? Having summarized such reactions, the means-oriented educator moves off to explore new instructional galaxies. Their just completed project has been a success.[3]

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[3] *Phi Delta Kappan.* December, 1969, p. 208.

It seems to me we have to guard against means-oriented educators in teacher education just as stringently as in any other field. There will be many such people. I am not going to identify the particular things that I think represent a means focus; but if you will start casting about in your mind for some of the very popular techniques we hear about today, I believe you will find some people advocating them because of the majesty of the means, not because of the demonstratable results that they produce. There is great danger when you take responsibility for bringing about measurable kinds of behavior changes. One can be wrong. We have had very good luck in this country with some filmstrip-tape programs that have been widely used. The first of these was a program on educational objectives which taught people how to discriminate between measurable and nonmeasurable objectives. The program generally has produced satisfactory growth. Pre-test or post-test growth generally runs from 40 percent for pre-test to 90 percent post-test. Because we have had quite good luck in this country with these things and people seem inclined to use them, we decided in our carefully beneficent fashion, to make them available to Latin American teacher educators.

We applied to the Ford Foundation for a small grant and received some money to translate several of these programs (starting off with the educational objectives program) into Spanish for use in Latin American teacher education. The translation was rendered by a very competent person. We took out the American flag. We took out all references to the Monroe Doctrine. Everything seemed to be very carefully tailored to Latin American teacher educators, so we took them to Mexico City and to Mexicali. In this country, growth was from 40 percent pre-test, to 90 percent post-test; in Mexico, growth was from 35 percent pre-test, to 36 percent post-test. Something I had felt was very good was shown by the evidence to be inadequate. I had to go back and revise the whole thing. After several agonizing reworkings, I have been only able to get proficiency up to 70 percent in Mexico and I am having to admit to myself that I cannot make it any better instructionally.

My plan did not work. The reason it did not work was because I could not make it work. It seems to me that, with respect to systems analysis, we must recognize there are some distasteful but important responsibilities associated with systems analysis, but in the area of teacher education, we can use this technique to a real advantage.

SOME CONSIDERATIONS UPON ENTERING INTO NEW ARRANGEMENTS FOR THE PREPARATION OF TEACHERS

Donald R. Cruickshank

Change in Teacher Education: Historical Perspectives

If one is to believe the writings of educational historians, teaching in early schools was considered neither a very arduous nor challenging occupation. According to French, "Lesson hearing was the most important part of one's responsibilities. In the discussions of schools, we seldom run across any mention of methodology, except memoriter recitations and caning as discipline."[1] Accordingly, during the early period of American history, little concern was paid to the preparation of teachers. The idea that "anyone can teach" became firmly implanted in the minds of all and remains in the minds of many today. Indeed, it was decades before some consideration was given to providing a special education for teachers.

One of the first mentions supporting the education of teachers was made by Benjamin Franklin in his prospectus for the establishment of an academy in Philadelphia, "...a number of the poorer sort will be hereby qualified to act as Schoolmasters in the Country, to teach children Reading, Writing, Arithmetic, and the Grammar of Their Mother Tongue, and being of good morals and known character, may be recommended from the Academy to the Country Schools for that purpose the Country suffering at present very much for want of good Schoolmasters...."[2]

By the 1830's mounting attention was being given to the special preparation of teachers. Contributing to that trend was Samuel R. Hall, a clergyman who had been sent to Concord, Vermont, by the Domestic Missionary Society in order to open the first seminary in America devoted exclusively to the preparation of teachers. A book published by Hall entitled *Lectures on School Keeping* received wide attention and distribution. Hall described the decline then in the status of public education and attributed it to inadequately trained teachers, lack of financial support, division of community opinion, and inadequate compensation for teachers. (It is interesting to note that 150 years later the same criticisms exist.)

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[1] William M. French. *America's Educational Tradition: An Interpretive History*. Boston: D.C. Heath & Co., 1964, p. 230.

[2] *Ibid.*

Hall's suggested curriculum for teacher preparation, based upon a common school education, spanned three years and included a review of subjects taught in the common schools, "some mathematics, book chemistry, natural philosophy, logic, astronomy, evidences of Christianity and moral and intellectual philosophy."[3] The capstone experience seemed to be a new study Hall devised called "the art of teaching."

Perhaps James G. Carter is best remembered for causing citizens to see the relationship between the improvement of the public schools and the preparation of competent teachers. His series of essays in the *Boston Patriot* proclaimed the urgent need for normal schools. The curriculum in such schools intended to give the prospective teacher a thorough grounding in the subjects taught in the common school, provided a course in the science and art of teaching, and provided a practice school for observation and experimentation. When the first normal schools were established in Massachusetts and in New York, students were enrolled for only brief periods of time, often up to eight months, with very few prospective teachers staying over six months. Substantiating that the preparation of teachers need not be a long process, a Professor Adams at Dartmouth was quoted about that time as saying that after 42 years of teaching experience, he could "communicate in an hour and a half all that could profitably be communicated by way of precept to aid one in acquiring the art of teaching."

Although normal schools existed, attendance at one was not required in order to meet certification requirements. High schools offered classes in teacher training, and as late as the 1900's it was not unusual that one could go straight from high school into elementary teaching. Many teachers, after short tenure, were promoted to teach in the high schools without themselves ever attending one.[4]

Late in the nineteenth century, according to Cremin, progressivism "cast the teacher in an almost impossible role." "...He was to be an artist of consumate skill, properly knowledgeable in his field, meticulously trained in the science of pedagogy, and thoroughly imbued with a burning zeal for social improvement."[5]

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[3] *Ibid.*, p. 232.

[4] *Ibid.*, p. 250.

[5] Lawrence A. Cremin. *The Transformation of the School: Progressivism in American Education*. New York: Vintage Books, 1964, p. 168.

Partially as a consequence of critics such as Joseph Mayer Rice ("The office of teachers in the average American school is perhaps the only one in the world that can be retained indefinitely in spite of the grossest negligence and incompetency.") the better normal schools across the country began to design four-year curricula. Now, for the first time, the preparation of teachers became associated with a college or university education. At the same time, liberal arts colleges started normal departments or hired professors of pedagogy. Some of these universities--Chicago, Michigan, and Stanford and one teachers college in particular, Columbia--marked the way and to this day have maintained leadership roles. It is interesting to note that the Teachers College is among the nine institutions supported by the United States Office of Education to redefine teacher preparation today.

During its formative years, Teachers College was influenced greatly by Dean-Elect James Earl Russell. Russell suggested four goals for the college student: general culture, special scholarship, professional knowledge, and technical skill. It is interesting to compare Russell's guidelines as reported by Cremins with those currently being espoused.[6]

Without going beyond this point historically, at least two things seem obvious. First, the development of special education for teachers has been a slow, laborious, and largely uneventful phenomenon, largely shaped by citizenry's demands upon schools and hence upon schoolmasters. Secondly, the curriculum for the special education of teachers had not changed significantly over the past 75 years.

Today, what is the situation at Michigan, Chicago, Teachers College, Colubmia, and Stanford? These schools and others, many of which are newcomers to teacher education, have made revisions in their programs. However, revision still seems to be in response to outraged citizenry and is most often directed by forces outside the education establishment. The advent of Sputnik and subsequent scurrying in public schools and colleges would seem to support this theory. The recent impact of black militancy and student power movements again attest to the "other directedness" of change in college and public schools today. Generally, as new societal forces become evident, professional education merely accommodates modification or adjustment. This phenomenon is somewhat comparable to the theory of "challenge and response" presented by the historian Arnold Toynbee. Although this evolutionary pattern has worked amazingly well, resultant teacher preparation programs have always been catching up purely by the nature of the response syndrome.

Have professional educators made real efforts to create advanced designs for teacher education curricula? Dean Herbert LaGrone argues "...there has been no serious attempt to explore the logical and psychological bases for preservice professional education."[7] Of course, colleges and departments of education have made efforts to design new programs. Whether or not they can be considered substantial or serious is left to the observer.

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[6] *Ibid.*, p. 173.

The Challenge to Teacher Education for the Seventies

The previous remarks were made in support of a challenge to the profession. No longer can we expect to engage in competition for public and private support without providing data regarding the effectiveness of our teacher education programs. No longer can we expect to produce socially relevant teachers until colleges of education become a part of the real world. No longer can we rely on the philosophic dictates of men and women of bygone eras. What is needed is opportunity and a dedication to plan and to implement totally up-to-date curricula for the preparation of teachers which are sensitive to the future and are unencumbered by the past, except by choice.

Recently the United States Office of Education has abetted this challenge through its Model Elementary Teacher Education Program (METEP). The nine models[8] which resulted are intended to meet the requirements of the seventies and beyond. They were developed with keen attention to a changing world. Their curricula have been shaped by assessments of what society and schools will be like in the future. For instance, the Florida State model proposes that there will be continued and accelerated social change and revised and intensified demands on education. In response to these changes and demands, the model projects a transformed elementary school and subsequent changes in the preparation of teachers for these schools.

Toward Implementing a New Curriculum

The Process of Change. Social scientists suggest that change probably occurs in three stages: initiation, followed by legitimation, followed by congruence. In the initiation stage, ideas for change are suggested and pondered. Consequently, decisions are made about the nature, direction, and extent of the change. The process involved in the first stage of change can be scrutinized by utilizing an interesting paradigm developed by Bennis in an old but useful publication.[9]

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[7] Herbert F. LaGrone. "A New Direction for Professional Teacher Education," *Teacher Education Looks to the Future*. A Report to the School for Executives, 1964 Conference, Washington: American Association of Colleges for Teacher Education, 1965.

[8] Participating universities were: Florida State University, Michigan State University, Northwest Regional Laboratory, University of Georgia, University of Massachusetts, University of Pittsburgh, University of Syracuse, University of Toledo, and Teachers College, Columbia.

Bennis suggests eight kinds of change: planned, indoctrination, coercive, technocratic, interactional, socialization, emulative, and natural. *Planned* change assumes mutual goal setting by participants with the participants sharing power in decision-making. This form of change is done deliberately. *Indoctrination* also assumes mutual goal setting and is done deliberately. It differs from planned change only in that the participants do not share power equally. Many public school classrooms are examples of this form of change. *Coercive* change is characterized by unilateral setting of goals and an unbalanced power ratio. Change is deliberate only on the part of the wielder of power. Basic training for the armed services may serve as an example of coercive change. In *technocratic* change, the change is brought about as a result of collecting and analyzing data. Whenever the data suggest change, it follows automatically. In this form there is deliberate attempt to change goals as dictated by input or output data. Technocratic change does not require collective or mutual goal setting. *Interactional* change occurs when people get together and quite nondeliberately, as a consequence of their interaction, effect change. In these situations power is evenly distributed. Change of this nature often occurs quite unconsciously and nondeliberately. The parent-child relationship effects changes in *socialization*. This form, too, is nondeliberate in that it usually goes on without conscious attention by either party. The parents wield power, however. When the parent wields power deliberately, this form of change merges into indoctrination. The seventh form of change is *emulative*. Here, change occurs by copying or being influenced usually by one more prestigious than oneself. *Natural* change, the last variety, subsumes changes caused by accidents or quirks of fate. Changes which occur as a result of floods or earthquakes fit this variety.

Although Bennis considers that his paradigm is "crude, arbitrary, and certainly not all inclusive," it is a frame of reference useful in speculating about the philosophy which will undergird curriculum development activities during the initiation stage.

Although modifications in teacher education can occur nondeliberately, serious deliberate attempts to reorder curriculum probably are required. Eliminating nondeliberate forms of change from the Bennis paradigm, we have the following Figure 1.

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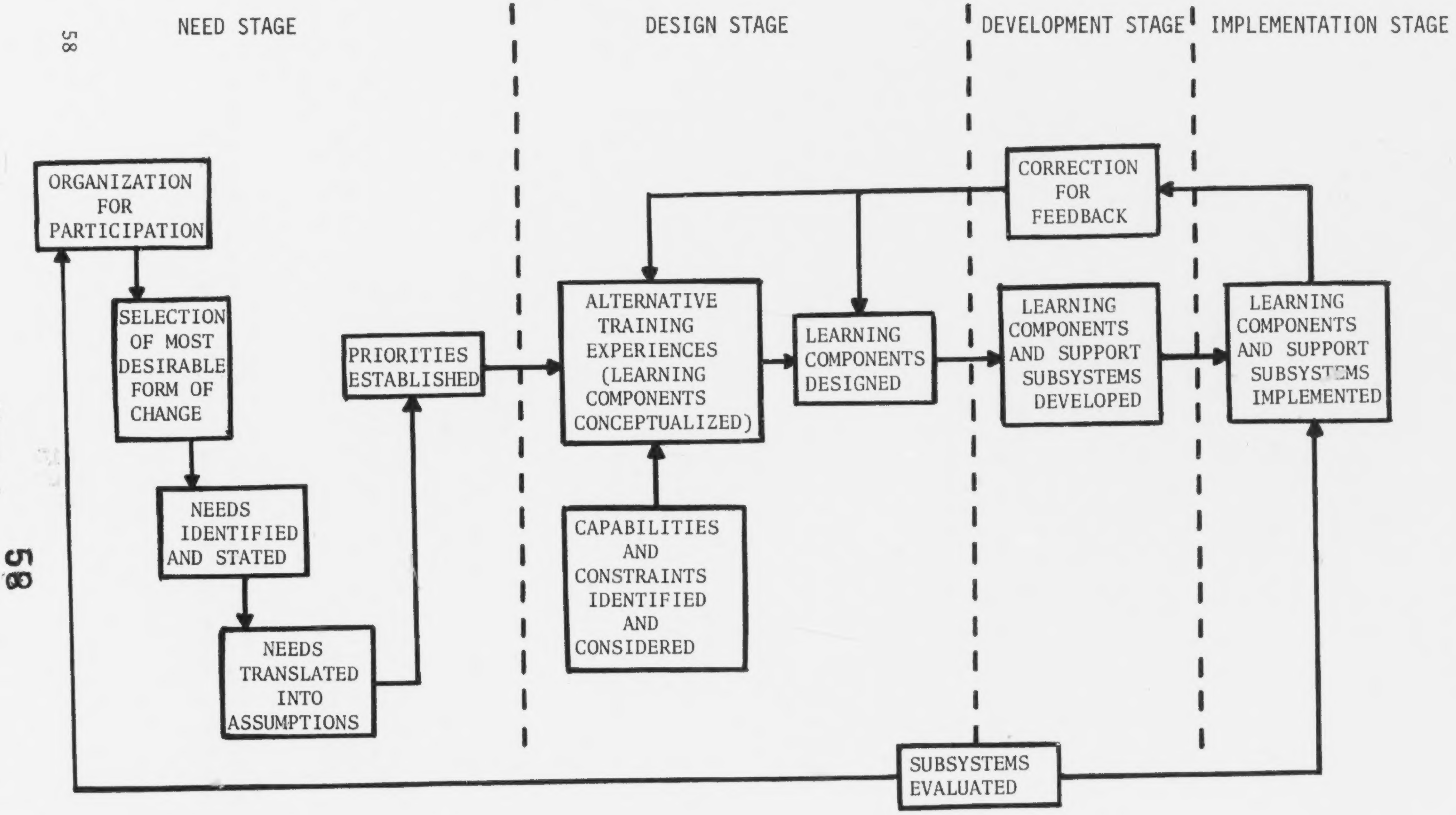
[9] Warren G. Bennis *et al.* "A Typology of Change Processes," *The Planning of Change*. New York: Holt, Rinehart, and Winston, 1962, pps. 154-156.


NEED STAGE
DESIGN STAGE
DEVELOPMENT STAGE
IMPLEMENTATION STAGE
ORGANIZATION FOR PARTICIPATION
SELECTION OF MOST DESIRABLE FORM OF CHANGE
NEEDS IDENTIFIED AND STATED
NEEDS TRANSLATED INTO ASSUMPTIONS
PRIORITIES ESTABLISHED
ALTERNATIVE TRAINING EXPERIENCES (LEARNING COMPONENTS CONCEPTUALIZED)
CAPABILITIES AND CONSTRAINTS IDENTIFIED AND CONSIDERED
LEARNING COMPONENTS DESIGNED
CORRECTION FOR FEEDBACK
LEARNING COMPONENTS AND SUPPORT SUBSYSTEMS DEVELOPED
LEARNING COMPONENTS AND SUPPORT SUBSYSTEMS IMPLEMENTED
SUBSYSTEMS EVALUATED

STAGES IN THE DEVELOPMENT OR METAMORPHOSIS OF A
TEACHER EDUCATION PROGRAM

Figure 1

Depending upon the philosophy and form adopted, change can range from a unilateral, powerful, coercive effort to define a new curriculum to a mutual, democratically shared endeavor. No attempt will be made to assume which approach is most likely to lead to significant changes in teacher education, but speculation is inviting. Very often the beliefs one holds in this regard are reflected in the kinds and ranks of people assigned to such curriculum responsibilities.

In an attempt to wed the notions discussed here with reality, permit me to reflect on personal experiences I have had in three teacher education institutions. In one, the president indicated that the teacher education program should change. He did not describe the direction of the change, but he did suggest the number of credit hours available and also admitted some biases. How would you classify this experience according to the subsets suggested by Bennis? I would consider coercive in that it was deliberate on his part. The power ration was 1:0 and there was no mutual goal setting. However, within the constraints imposed, there still was considerable freedom and momentum was assured. In a second setting, the college dean made an *ad hoc* committee and charged it "to plan a comprehensive program in teacher education which stems from a rationale which is sound, but somewhat different from the present program." How would you classify this mandate for change? I classify it as indoctrinational in that there would be mutual goal setting (no constraints or biases were established), yet the power was uneven ("there must be a new program"). In the third institution, the faculty itself decided to enter into revision of its teacher education curriculum. The action was deliberate, power was shared equally, and mutual planning and goal-setting was implicit. I would classify this as planned change.

Until now we have discussed only the nature of change. Attention also must be given to the direction and extent of the change. In terms of implementing a new program in teacher education, several approaches are possible. The most obvious ones are to develop a new curriculum or to adopt one or an eclectic of several. Utilization of one or more of the USOE METEP models would be an example of the latter, while starting from scratch, so to speak, would typify the former. I will assume both stances and examine the requisite methodology.

Adopting an Existing Model. The decision to change to an existing model should be based upon the success to which it approaches some criteria or standards. At the Ohio State University we were attempting to make decisions regarding the validity of the nine METEP models and others. In order to view each model in some uniform way, we established evaluative criteria. The same criteria could be applied in judging any existing program in teacher education. Obviously, they reflect biases and any such list should be developed and utilized with appropriate acknowledgement of one's values. The values we hold are both explicit and implicit in our list. Examine the University of Tennessee model in the following Figure 2 and use it as an example applying our criteria. The UT model was developed prior to the METEP program.

1. What is the rationale underlying the model program? How was it established? How is it supported by experience, research, or logic?

2. What are the components (programmatic features) of the model? What relationships exist between the components and the basic rationale? Are specific rationales available to support each component? Is the model consistent philosophically?

3. What are the anticipated outcomes of the model program? Are desired teacher behaviors presented? Upon what evidence are the requisite teacher behaviors used?

4. What instructional techniques are suggested? What rationale exists for each?

5. What is the role of the teacher educator? How is the role determined? How definable is the role? What changes in training teacher educators are implied?

6. What evaluation techniques are suggested? What rationale supports these techniques?

7. In what ways is the model responsive to societal and professional needs or concerns, e.g., preparation of teachers for urban American, early childhood and parent education, continuing education of teachers, staff differentiation, utilization of technology, or others?

8. What are some unique contributions the model seems to make to teacher education?

9. What provision does the model make for keeping the new program relevant?

10. How is the model related to the general education (liberal arts) program?

11. How feasible for implementation does the model seem to be?

SUBSETS OF DELIBERATE CHANGE	POWER RATION	MUTUAL GOAL SETTING
(1) Planned	.5/.5	Yes
(2) Indoctrinational	1/0	Yes
(3) Technocratic	.5/.5	No, change based on data
(4) Coercive	1/0	No

REVISED BENNIS PARADIGM

Figure 2

12. How does the model stack up against the most recent NCATE standards which present qualitative concerns for the preparation of teachers?

The NCATE Standards also provide a set of evaluative criteria.

Another set of questions or criteria developed for use in examining the models was developed at Clark College in Atlanta. Clark's concerns were:

1. Are any "common features" identifiable that can be assessed as *trends* in the education of teachers for elementary schools?

2. Can the model be adopted to a four-year, four or five, or five-year program without destroying its effectiveness?

3. What was the most distinctive or innovative feature of the model?

4. What feature(s) of the model is already operative in the Clark College program?

5. Which phase(s) of the respective model could be tested successfully without increased faculty, facilities, equipment, or faculty approval?

6. Which phase(s) of the respective model are desirable or could be tested successfully only with increased faculty or in-service training, additional facilities and equipment, or faculty approval?

7. Is it possible to articulate phases of the METEP models with the overall curriculum revisions presently being studied?

8. Are there significant behaviors of effective teachers needed by Clark College students that have been omitted from the models?[11]

Developing a Model. While at the University of Tennessee we engaged in a long and difficult effort to develop and implement the model program in teacher education shown earlier in Figure 2. At that time, beginning in July of 1966, we sought parameters which would assist us since we had no

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[10] The University of Tennessee, Proposal to AACTE for Distinguished Achievement Award Competition, 1969.

readily available models to choose from or emulate. Following several abortive attempts, a rather elaborate scheme was adopted to determine the undergraduate professional education curriculum. We began with an attempt to identify dominant social, economic and political forces, and other factors affecting education and, by the process of extrapolation, arrived at implications for the training of teachers. Some of the forces we identified included (1) the emergence of non-white populations as a force in America, (2) the increasing mobility of the population, and (3) the power of the teacher. The process, if completed, would have assured development of teachers who were aware of and responsive to the real world. Unfortunately, the process became so time consuming for some that it became painful. To reduce the pain, another less demanding approach was instituted. Consequently, in one three-hour period we brainstormed a new program and then, in a backward way, stated the underlying rationale for it. Actually, the resultant program was quite legitimate in terms of newer notions about teacher preparation. It was superior in that it provided for early engagement and career choice, self-study, use of principles of human learning in teaching, utilization of behavioral objectives, and use of newer technologies and methodologies, including microteaching and simulation. The Tennessee program also provided for self-instruction and self-pacing, and assessment was based upon performance criteria.

Placed in the position of developing a model anew, I would spend a good deal of time (more than most people tolerate) developing a rationale before I began any work on building components into a model. Reflecting on most of our present teacher education programs, few of us could defend what we are doing. When placed in such a defensive posture, we probably would reply in much the same was as Sancho, Don Quixote's manservant, when he was asked why he followed this strange knight errant. He replied: "I don't know! I just like him!"

Beyond establishing the rationale, other considerations would include:

1. What observable behaviors should prospective teachers be able to demonstrate before providing them with licenses?

2. What specific educational and training experiences most likely will provide the prospective teacher with the requisite behaviors?

3. Where and under what conditions can the behavior be learned most efficiently?

4. What models of instruction are most likely to facilitate learning the behavior?

5. How will attainment be measured?

6. How will the program provide for renewing behaviors and maintaining them at acceptable levels?

7. How should the learnings indicated be organized in order to provide for the greatest effectiveness and efficiency?

Necessarily, the resultant specifications and emergent models would need to be sensitive to the demands of a dynamic world. Provision should be built in to keep the model current.

A definite relationship should exist between the real world--which serves as the reference system for training--and the training system itself. The real world of teaching should determine what the teacher training system should be like. If the school can or should create a different world--a new social order--that world would have to be fashioned philosophically and a new training system devised.

Recall earlier, that change was considered to occur in three stages: initiation, legitimation, and congruence. In the initiation stage teacher educators are concerned with the nature and direction of change. Our thinking to this point and the work of the METEP model developers in Phase I go only through this stage. In summary, considerations in stage one seem to focus upon three questions.

1. What kind of change will we have? Here, if we use the Bennis paradigm, issues include goal-setting, power, and deliberateness.

2. What should be the nature and direction of the change? Should we adopt an existing model or develop a new one? What are some criteria for judging existing models? How to go about developing a new one?

3. What will be the extent of the change? Is this to be a new house or a remodeling job?

Legitimation. The second stage of change requires that favorable sentiment be mastered and communicated. Unless the process has involved everyone, many remain unconvinced. Doll, citing Bennis' work concludes that this stage of change will be facilitated by employing planned change rather than another form. "...To function enduringly, change should apparently be a deliberate, collaborative process involving the following features: (a) a joint effort that involves mutual determination of goals; (b) a spirit of inquiry--a reliance on determinations based on data publicly shared; (c) an existential relationship between change--agent and client--with either party free to terminate the relationship after joint client consultation; (d) a power distribution in which the opportunities to influence each other; and (e) an emphasis on methodological rather than on content learning."[11] Doll's suggestions would seem to enhance support-getting and communicating. One caution, however, based on experience: *unless the entire faculty engages in the curriculum reform process, there will always be some who, for a variety of reasons, are not "tuned in."* At one institution where I was involved in developing and implementing a new program in teacher education, we pondered these related problems of support and communication. Even though many well-publicized meetings were held in order to keep the uninvolved faculty informed and to provide a forum for the resolution of conflict, very few of the faculty involved themselves. This seeming apathy more legitmately was a function of preoccupations with other more immediate work or anxiety regarding the contemplated changes.

Congruence. Once the curriculum change has been communicated, well or badly, many issues and conflicts probably will become apparent. The task at this stage is to try to resolve the disperate ways of thinking and valuing to the extent that change can occur. According to Doll, this stage "...involves congruence of the separate systems of values which are held by the person or persons seeking to create change and by the person or persons who are targets or human subjects of the proposed change."[12]

It is readily apparent that the so-called stages of change selected and discussed are not discrete. What happens in one stage carries over and affects what happens in the next.

Constraints. In developing a model teacher education program, constraints--imaginary and real--should be considered. This section will focus on factors inhibiting change.

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[11] Ronald G. Doll. *Curriculum Improvement: Decision-Making and Process*. Boston: Allyn and Bacon, Inc., 1964, p. 124, citing Warren G. Bennis *op. cit.*

[12] *Ibid.*, p. 123.

Early and careful planning to eliminate or reduce such forces and circumstances will be well worth the effort expended. Most of the constraints discussed will be those experienced directly while working toward the development and implementation of new teacher education programs. The list following is not intended to be exclusive. Neither are the constraints placed in any order of difficulty.

1. *Seriousness of purpose* as a constraint. As with many efforts in colleges, faculty members may not take the idea of changing the curriculum seriously. Many, if not most of them have been around long enough to have witnessed and participated in lots of motion and commotion with little payoff. Likely, they have seen their recommendations go unheeded and have grown reluctant to believe such efforts make any difference. Even willing participants and faculty leaders must be given visible assurances that this is not another "wild goose chase." Visible support could include faculty released time, a special budget or other indications of good faith. At the same time, it would be well for the college dean to determine the seriousness of purpose of university-wide administration. The greatest frustration to college faculty and dean will occur if a new program is developed for implementation and no financial support for it is available.

2. *Evaluation* as a constraint. An exploration of this constraint would require more time and space than is available. Suffice it to say a carefully worked out plan to evaluate the proposed curriculum change is a basic requirement of any placed change. Since many teacher education institutions may not have personnel trained in evaluation to assist them, they should provide for these services on a consulting basis. Faculty members increasingly are suspicious of uncontrolled experiments and subjective reporting of results.

3. *Faculty obsolescence* as a constraint. Most proposed programs in teacher education, including the METEP models, suggest very different roles for the teacher educator. Often he is depicted as a curriculum developer, a learning manager, or the leader of an inquiry team. Such roles are new and threatening to most of us. A great deal of reluctance to participate will result from an honest admission that new programs will put some of us out of business or cause us to be retread. Consequently, provision must be made for the continuing education of the teacher educator. It is quite likely that colleges will need to grant some faculty members leave in order that they can gain requisite skills. At other times, consultants may come onto a campus to provide in-service work for groups.

4. *Representativeness of participants* as a constraint. No matter who or how many persons serve to develop or adopt new curriculum, there will always be those who have been relatively uninvolved. Although it will be most difficult to represent all departments or faculties, every effort should be made to do so. Further, efforts should be made to insure that communication exists between the curriculum developers and the faculty at large. No matter how carefully such details are worked out, one can expect some to complain that they have not been asked to participate and they have not been kept informed.

5. *Lack of a theoretical framework* as a constraint. Earlier in the paper great emphasis was placed upon the need to develop a rationale for the teacher education curriculum and that the rationale should be based upon research, experience, and logic, among others. Without the support of a firm basis, curricular experiences will be judged as suspect and assumed to be no better than the present conditions.

6. *Formal approval of the new curriculum* as a constraint. Much time and effort will need to be expended in touching all bases to get official approval of the new program. Most institutions require approval at department level, college level, and industry level. In addition, changes should be brought to the attention of state education personnel if they have not been involved heretofore. In addition, certain approvals are contingent upon earlier approvals by faculty standing committees. Those familiar with the idiosyncracies of college committees, departments, and state education departments have good cause for concern. The task of garnering officials' approval will be long and arduous.

7. *Development of new curriculum materials* as a constraint. Any new curriculum will demand the development of new training systems and teaching aids. Textbooks as presently known probably will play a very small role. Instead, self-pacing, self-instructional modules, simulations, and a variety of laboratories will be required. Provision will have to be made for services of people who can both design and construct new curriculum materials and settings. Alternatives include having new staff with such skills, arranging for consulting help and/or retraining present staffers.

8. *Management of the new program* as a constraint. Full-time attention will need to be given to program management. Utilization of PERT or some other management system should facilitate the job. This task might best be performed by a trainer systems analyst rather than a college professor.

9. *Course credit and grades* as a constraint. Since colleges and universities are almost arbitrary when it comes to giving credits and a grade for courses,

they probably will find it difficult to accept grading notions such as pass-fail and giving credit for completion of behavior rather than courses.

10. *Data collection* as a constraint. During field tests of curricula being implemented, significant amounts of data need to be collected in order to revise later program repetitions. At the University of Tennessee we developed an outline for a report to be submitted by a faculty member after he had field tested a part of the new curriculum. The form used is attached as Appendix A. Essentially data were sought regarding special materials needed, forms of evaluation used, results, costs, and other factors.

Summary

Until recently, changes in the preparation of teachers have been neither far-reaching nor rapid. Teacher education has enjoyed the luxury of being able to saunter forward very slowly, stopping now and again to take care of this crisis or that. Now, with the advent of newer technology, with a country involved in a new social and political revolution, teacher education finds itself stepping up its pace, running if you will, with its eyes on the horizon contemplating the future. We have borne witness to some of this new behavior. We have seen nine universities and agencies and some others pick up the pace. All of us are involved. The stakes are perilously high for there are those who believe the present system is too rigid and too bureaucratic to change.

In order to run and not stumble, either on the way or near the finish line, suggestions have been offered to an institution interested in moving with the pack. The process of change is touched upon and varieties of change noted. Next, several approaches to changing the teacher education curriculum are provided and discussed. Essentially, they are developing a new curriculum, adopting one developed elsewhere, or utilizing some combination thereof.

Two sets of criteria are presented which could be used to assess an existing model such as those developed as a consequence of the Bureau of Research METEP project. For institutions considering starting from scratch, other guidelines and suggestions are offered. Finally, constraints or forces and circumstances inhibiting changes in teacher education programs have been listed and briefly discussed.

APPENDIX A

PILOT PROGRAM DESCRIPTION AND EVALUATION REQUEST

I. Title of the component.

II. Director.

III. Dates field tested (inclusive).

IV. Objectives of the component (behaviorally defined).

V. Activities (related to accomplishment of each objective).

VI. Special materials, equipment, or other used.

VII. Forms of evaluation used. (Include pre-and post-tests, if any.)

VIII. Results.

IX. How was the component as taught consistent with attempts in the Pilot Program?

A. To provide for individual differences in college students?
B. To provide more instrumental (direct) experiences?
C. To utilize behavioral objectives as evaluative criteria?
D. To increase self-knowledge?
E. To provide for self-instruction (learning at one's own pace)?
F. Other.

X. Discussion and recommendations for modification.

XI. Cost of operation per 30 students (approximate).

A. Staff salaries (pro rata).
B. Temporary help.
C. Operating expenses (Include long distance telephone, purchase of supplies or tests, duplication, travel or other).
D. Equipment rented or purchased.
E. Total.

VARIATIONS ON A SYSTEMS THEME:
COMPREHENSIVE REFORM IN TEACHER EDUCATION

Bruce R. Joyce

In recent years the United States Office of Education has sponsored a program to apply systems planning techniques to the reconstruction of teacher education curriculums in the United States. On March 1, 1968, ten institutions in the United States, several as coordinators of consortia, commenced an attempt to build system models from which teacher education programs could be constructed. These were: Florida State University; University of Georgia; University of Massachusetts; Michigan State University; Northwest Regional Educational Laboratory; University of Pittsburgh; Syracuse University; Teachers College, Columbia University; the University of Toledo; and the University of Wisconsin. The institutions completed their final reports within eight months and several then began studies of the feasibility of the models.

To the curriculum theorist, the product of this effort represents a first generation effort to make an application of broad systems planning principles to a major area in education. Although the work was concluded within a very short period of time, and is flawed seriously as a result, we have not before in the history of education had an occasion in which ten teams have approached the same area simultaneously, employing similar and conscious program-planning principles, but otherwise under no constraints to do similar work. The products are a base on which some major attempts at comprehensive reform in teacher education will be based. In addition, the result of the effort is exceedingly instructive in terms of the technologies of curriculum development.

It is especially interesting to look at the resulting products in terms of the similarities and differences with which the teams of planners completed the tasks of systematic program construction.

Hence, in this paper, we will begin to make an analysis of the commonality and variety with which six program planning tasks were completed. Although "systems" procedures have by no means been standardized, the six tasks generally appear in any paradigm for systematic program construction, although they sometimes exist under different names than the ones which will be employed here, and the order in which they were accomplished varies quite widely. However, there is a certain logic in the following order:

1. *The development of the performance model.* A major task is the conceptualization of the goal of the training program, and this task must be accomplished in terms of a working model of the product of the program. The performance model should be as complete as possible, describe aspects of performance, describe interrelationships among the aspects--and it must work. In the case of a teacher education program, the fulfillment of this task requires the development of a working model of a functioning teacher. This model is described as an input-output system. Furthermore, the teacher must be conceptualized in terms of the system within which he is operating. Classrooms and schools need to be described at a minimum, as well as teams of teachers if he is to be a member of a team; and it would be desirable if the conceptualization were to include also the wider systems of the community within which the educational institution functions.

2. *The analysis of the performance model into sets of behavioral objectives.* The model has to be broken down into specific domains of functioning, if these are not already available within the model. These, in turn, have to be broken down into sets of behaviors, sequentially organized wherever that is possible, so that programs can be built to achieve those objectives, and to provide the trainee with the devices for integrating them into the overall performance system. This task is exceedingly complicated when one is dealing with a complex functionary like a teacher, cognitive behaviors, affective behaviors, and skills interrelate and overlap, but they must be perceived distinctly and in relationship to each other if rational program planning is to proceed.

3. *The specification of training subsystems. (The development of components and component strategies.)* The next task consists of the development of program components to accomplish distinct sets of behaviors. Within each set component, distinct curricular or teaching strategies need to be constructed, and sometimes a good many of them need to be developed for a particular component. Components need not be homogeneous with respect to teaching strategies. For example, the same component may use sensitivity training techniques to achieve certain kinds of behavior, and behavior modification strategies within simulators may be employed for yet other sets of behaviors. However, the training subsystems need to be clarified in a modular organization. One of the really interesting features of the developed ten models is the very wide range of curricular strategies which are recommended within and between components.

The development of components needs to be accompanied by the development of specifications for needed support systems (as closed-circuit television laboratories, etc.).

4. *The development of the overall training system. (The creation of interlocking relationships among components.)* It is always tempting for a program planner to develop discrete components having their own distinctive strategies, their own instructional materials, and their own special procedures for staff training. However, both for the sake of the student, whose life should not be fragmented unnecessarily, and in order to achieve an integrated performance at the end of the program, components need to be related to one another systematically, then modules cast in reconcilable terms. In addition, support systems need to be developed and integrated into the training components, and the performances required of training for *them* has to be identified.

5. *The development of management systems to monitor a large program.* To enable a system to adjust to the individual differences among students--both in terms of goals, achievement, and learning-style, to build in provisions for program revision, to insure continuous feedback and evaluation for managers, faculty and students--and to integrate components and support systems smoothly--comprehensive management systems need to be developed.

6. *The reconciliation of the program and product with the client and the field.* A young person entering the field of education has personal needs and conceptions of teaching which he needs to explore and to relate to the training opportunities which are presented to him. He has to explore himself as a person on his own terms as well as explore himself as a professional-in-training. Whether he is learning to be a teacher aide in a hierarchical team, or preparing to be a specialist in a subject discipline, he needs to learn frames of reference which will enable him to apprehend alternative careers and ways of following them, ways of reconciling his personal needs for marriage and family with the demands of career; and he needs to learn how to make a training program work for him so that he does not become simply an artifact of a machine. Hence, specific procedures for humanistic guidance have to be developed for the client of the program.

Similarly, the teacher education program cannot be unrelated to the field which it serves. Teacher education has to supply the institutions which serve children with competent and humanistic personnel. These institutions must share in the identification of competencies and the development of training procedures. A smooth transition needs to be provided between any training institution and the educational institution in which the teacher will work. The creation of the setting for teacher education, in fact, is a problem for universities, training institutions, and elementary and secondary schools--and not for any of these working in isolation from each other. The problems of reconciliation with the field become particularly acute when the training program is designed to produce a teacher who is in any way different from the typical functionary in the existing schools, and whoever designs the training program, it is almost always a major hope that they *will be different*.

The completion of these six tasks results in a program model which is ready for feasibility testing and for the development of implementation stages, that is, the creation of instructional materials, program and management systems, support systems, staff training procedures, and the like. The program models become the guidelines of these activities.

In order to lay bare the similarities and differences among these first generation program models with respect to the six tasks and to do so in such a way that the diversity of products for each task is illuminated fully is not possible in a paper of article length. The original reports from the ten projects consumed over 3,500 pages; and much of the effort is embodied in documents not included in the final reports. Therefore, we will treat the first task, the nature of the performance model, rather completely, but provide limited illustration of commonality and diversity from the second to the sixth tasks. Thus, the major portion of the paper will be devoted to a survey of the program models as they developed the first task of establishing a performance model. This will give as clear an idea as possible of the complexity of systematic program procedures and of the extraordinary variety of performance models which emerge when different frames of reference are permitted wide latitude as systematic planning procedures are employed in a major training area. This variety is particularly interesting because of the common belief that systematic program planning necessarily results in program homogeneity. This has distinctly not been the case with respect to teacher education. Hence, our title, *"Variations on a Systems Theme."*

Common Assumptions

The teams worked separately from each other and completed their reports within a very short span of time. However, in addition to their use of systematic planning procedures, the ten teams operated on certain implicit, but common working hypotheses about teacher education and training programs. Although they differed considerably in ways they applied these assumptions to teacher education program development, the following common hypotheses are manifested through the program reports and represent basic but tentative assumptions which either implicity or explicitly formed a common frame of reference about teaching and training, on the basis of which decisions could be made concurrently with the testing of the assumptions themselves.

1. All of the teams viewed the teacher as *a clinician* in much the same sense that physicians are clinicians. The teacher was seen as the possessor of strategies for making instructional decisions, and as the possessor of the needed repertoire of knowledge and clinical skills for carrying out his decision. It was assumed that decision-making competence and interactive teaching competence would be defined with precision and play prominent roles in the performance model.

2. Teachers generally were thought of as *members of clinical teams*, and frequently as *specialists on those teams*. Several of the models provided "career ladders" with places for many kinds of specialists in a career hierarchy. This should not be interpreted to mean that "team teaching," as presently practiced, was seen as a panacea for the ills of education. Rather, it reflects the belief that collegial relationships are necessary so that teachers check one another's opinions, examine one another's teaching, coach one another, and specialize in order to increase competence.[1]

3. All of them assumed that it is possible to *define the needed competences of the teacher in terms of specific behaviors* and to match those behaviors with specific learning experiences, especially short instructional modules calculated to achieve those objectives. Furthermore, it was assumed that large sets of instructional modules could be combined into curricular systems which could be entered at many points in the teacher training process and could be stored in automated data banks so that they could be retrieved on the basis of diagnoses shared in or even made by the teacher trainee himself.[2]

4. It was assumed that *management and control systems could be developed to monitor such teacher training programs and to provide them with flexibility*, especially adaptability to the student. In several cases, the models included the specifications for computerized systems for managing programs, including several thousand behavioral objectives matched with an equally large number of instructional modules.

5. All of the models assumed that *any teacher who could take major responsibility in a classroom would need a long period of training* and that a consortium of colleges and school districts was necessary to provide the conditions for academic training, preservice training, internship or practice teaching, and continuing in-service education. They also assumed that an educational team would contain personnel of more limited functions whose training could be relatively brief.

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[1] The conception of the teacher articulated by Robert Schaefer in *The School as a Center of Inquiry*. New York: Harper, 1967.

[2] The Michigan State Model, for example, contained more than 2,300 behavioral objectives matched with instructional models, all organized within an automated retrieval system.

6. All of the teams made a heavy use of *simulation laboratory situations* which are somewhat less complex than the "real world of the teacher" in order to teach clinical skills. The "real world of the classroom" is thought to be entirely too chaotic a place to learn many teaching skills. The simulation laboratory by simplifying the training situation, permits teaching skills to be acquired sequentially until the teacher has a range and depth of competency to cope with and learn in the complexity of the school situation. The models tend to prescribe a sequence of activities which proceed from an identification of a clinical skill, its practice under simulated conditions or with small groups of students, and then its practice in a field situation. This kind of pattern, replete with systematic feedback and assessment, occurred again and again in all ten of the models.

7. All of the teams hoped to make available to the teacher *knowledge from the behavioral sciences about the conduct of education*. They see the teacher as an applied scientist in a basic sense of the word. At the same time they were acutely conscious of the limits of our knowledge, both about teaching and about the preparation of teachers. Hence, most of the models included a large variety of strategies for preparing the teacher, and all of them were designed to equip him with a large repertoire of teaching strategies that he could select from and use with his students.

8. Last, all of the teams assumed that *a model should contain provisions for revision and redevelopment as a fundamental feature--not as a subsidiary element or aftergrowth*. Replanning and reimplementation are assumed to be basic, as basic as training components themselves. Also, all of these models were created within a very short period of time, and each of the teams was acutely conscious of the need to build a structure that could be revised and further developed. Consequently, various aspects of each model are better developed than other aspects. In some cases, the behavioral objectives are elaborately specified; but much work remains to be done in the development of instruction systems to achieve those objectives, although the basic strategies are laid out. In other cases, a great deal of attention was paid to the development of management systems, although much remains to be done to build satisfactory behavioral objectives and instructional modules to complement the well-developed management systems. A fortunate result of this is that there presently exists for the field of teacher education a set of exemplary components--elaborate performance models of teachers, intricate instructional systems, comprehensive management systems, and well-developed procedures for creating and administering consortia for teacher education; but none of these is fully present in any model and all of the models contain integral provision for redevelopment.

Let us now look more closely at the development of the performance models and, at the same time, weave in some idea about the ways the teams approached the other five tasks.

The Nature of the Performance Models

A performance model is an integrated set of behaviors which are coherently related to each other. This system of behaviors constitutes the model which the educational program is designed to achieve.

There are great difficulties to the development of a "system" description of a complex functionary like a teacher. There are four general ways of developing the conception of the desired system of behaviors. One of these is by the empirical study of a functionary. To develop a model of a salesman (for example), we might study the most successful salesman of a given product (the one whose dollar sales were the highest) and determine their behaviors. A second method is to obtain a consensus by members of a field about the characteristic or optimal behavior of functionaries within the field. Again, using the case of a salesman, one might ask outstanding salesmen what behaviors were responsible for their success, or ask regional sales supervisors what makes the best salesmen "tick." A third is to derive the model from the application of a theory, either an empirically-verified theory, or a deductive construction. Again, with respect to salesmanship, one might study social-psychological theories about the kinds of factors which bring about sales, with the object of training salesmen to bring about those conditions. Selecting a theory, one would decide the properties of the salesman from it. The fourth method is to make a comprehensive analysis of all the processes engaged in by the functionary. Such an analysis would draw on theories, consensus, and the application of empirical studies where appropriate. To develop a model of an airline stewardess, for example, we might analyze the aircraft and the equipment, work out a description of services which might be offered during flight, check customer and supervisor opinions, and build, from those data, a simulator in which we could try alternative patterns of behavior until a satisfactory combination emerged.

Ultimately, the application of systems procedures to the development of a training program requires the fourth course of action. We are not ready for this course yet; however, there are a few empirical studies of what teachers do and there is little knowledge about the kinds of procedures which are followed by the most able teachers. (In fact, how to identify effective teachers is a question which has by no means been resolved!) There is considerable controversy about what criteria of performance to use. The position taken by many educational leaders, such as Arthur Combs[3], that the most effective teachers are those who are most fully themselves, and have developed a style which actualizes their personality, almost denies that there *could* be agreement on the performance of a capable teacher, for they would be unique. Also, there is not yet a sufficient theoretical base, particularly one grounded in empiricism, to permit a full description of the efficacious teacher in terms of a theoretical model about the conditions which produce learning. Yet, there are sound theoretical positions about learning and training, and many of them are empirically grounded. The work in this area simply is not complete, but there is much on which to build.

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[3] Arthur Combs. *The Professional Education of Teachers: A Perceptual View of Teacher Preparation*. Boston: Allyn and Bacon, 1965.

Each of the model-builders had to reconcile himself to our present state of knowledge. All worked under the serious limitations of time, or they probably would have engaged in major studies to create more comprehensive analyses of the teacher function. Yet, considering the time limitation, the analyses actually engaged in are remarkably complete and similar, although the range is instructive. In their work, we can see variations on each of the four ways of developing performance models.

Each team of model-builders made a set of choices which narrowed the ground he had to search as he tried to develop a performance model. The approaches which resulted are interesting in their diversity, but also in their common belief that it would be impossible to develop performance models of teaching. As indicated above, they all shared the belief that a complex professional functionary would have to be a decision-maker and a clinician, in the same sense that a physician is both of these things. (He decides and he executes.) They all envisioned a complex functionary of far greater responsibility and capacity than is ordinarily the case in today's schools. Within their models also, they tended to develop career hierarchies, ranging from the more simple to the more complex functions within team structures. Let us look at some of the results.

The Pittsburgh Approach: An Individualizer of Instruction

The Pittsburgh team selected the individualization of instruction as the focus of teacher training. They decided to build their performance model around a conceptualization of a teacher who could individualize instruction and who would work in schools organized to tailor instruction to individual students.

> Individualized Instruction. The central theme in the elementary instructional programs for which the new model will train teachers is individualization. This term covers any arrangements and procedures that are employed to ensure that each pupil achieves the learning goals designated for him.

> The definition of individualization used in this model is as follows: *Individualized instruction consists of planning and lessons that are tailor-made to suit his learning requirements and his characteristics as a learner.* This definition focuses on instructional planning with and for each individual student before teaching him, then teaching him according to the plan.[4]

Six features of individualized instruction programs are identified, and the Pittsburgh program is designed to teach the future teacher how to bring about instruction that has those characteristics.[5]

1. "Instruction is organized in terms of programmed curricular units rather than courses, with the units in each curricular area arranged in a specified sequence."
2. "On the basis of achievement pretests and the diagnosis of learner characteristics, lessons are tailor-made with each pupil rather than being planned for a group."
3. "Several modes of individualization are employed singly or in combination, in suiting instruction to the individual pupil: varying learning goals from pupil to pupil, varying learning materials and equipment, varying the learning setting (independent study, pupil team, tutoring by the teacher, small group working without the teacher, large group), varying instructional techniques, assigning different students to different teachers, and varying the rate of advancement through the curriculum."
4. "Each pupil is expected to master a learning task before proceding to the next task; mastery is determined with use of a unit post-test. The criterion score for mastery is empirically determined in relation to performance on subsequent tasks."

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[4] University of Pittsburgh. *A Model of Teacher Training for the Individualization of Instruction* (OE 58017). Washington, D.C.: U.S. Office of Education, 1968, p. 3.

[5] *Ibid.*, pp. 4-5.

5. "Teachers offer pupils help chiefly on an individual basis, and are always available for consultation."

6. "The pupil conducts most of his learning independently of the teacher, employing self-direction."

(It is worth noting that the Pittsburgh design for teacher training utilized the same features that they wish the teacher to employ in individualizing instruction. In other words, the same specifications are used for the teacher performance model as for the teacher education system model, except for the obvious adjustments for client differences.)

To make an operational description, the description of individualized instruction was expanded and made specific.

The Pittsburgh approach contrasts interestingly with the one developed by the Northwest Regional Educational Laboratory team.

The Comfield Approach: A Teacher Who Can Produce Learning

The performance model developed by the team representing the consortium gathered together by the Northwest Regional Educational Laboratory began with a description of the teacher as a "person who can bring about learning in children." Or stated differently, "who can bring about appropriate changes in pupil behavior."[6] In order to make this specific, they had to develop a descriptive taxonomy of the kinds of learning that are desirable for elementary school children and determine the kinds of teaching which would be likely to achieve those objectives:[7] "Having established the prime objective of a teacher education program, the next step is to be brought about. In terms of a systematic analysis, this requires four interrelated steps:

1. Specification of the pupil outcomes desired;
2. Specification of the conditions by which each outcome can be realized;
3. Specification of the competencies needed by teachers to provide the conditions that are needed for the realization of each outcome; and
4. Specification of the conditions by which the needed teacher competencies can be realized."

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[6] Northest Regional Educational Laboratory. *A Competency Based, Field Centered, Systems Approach to Elementary Education* (OE 58020). Washington, D.C.: U.S. Office of Education, 1968.

[7] *Ibid.*, p. 7.

In order to make a full development of such a statement of performance, the Comfield team needed to go through four steps. The first three defined the performance model, or the goals of teacher education, and the fourth developed the teacher education program itself.

Steps in Developing a Program: Comfield[8]

Step 1 Pupil outcomes that are desired.

The goals of education.

Step 2 Conditions that bring about the pupil outcomes that are desired.

The instructional program within the schools.

Step 3 Competencies needed by teachers to provide the conditions that bring about the pupil outcomes that are desired.

The goals of teacher education.

Step 4 Conditions that bring about the competences teachers need to provide the conditions that bring about the pupil outcomes that are desired.

The teacher education program.

Put another way, it was necessary for the Comfield team to develop a taxonomy of pupil outcomes, to make postulates about the kinds of environmental conditions that would be likely to bring about those outcomes, to make a further specification of the behavior of the teacher that would produce those environmental conditions.

This approach involves the specification of theoretical or empirically-derived positions about learning. It thus can take advantage of the behavioral sciences, but must also operate under the limitations that exist in our present knowledge about how to bring about various kinds of learning outcomes.

It is worth noting that both the Pittsburgh and the Comfield approaches conceptualize the teacher as a behaviorist (all the models do). The behaviorist concept requires the teacher to specify learning outcome in terms of pupil behaviors, and each requires that the teacher attempt to tailor the environment to the characteristics of the student, and to the particular kinds of outcomes desired. Whereas the Pittsburgh model emphasized the specification of means for producing outcomes for particular learners, the Comfield model includes individualization as a general aspect of educational method.

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[8] *Ibid.*, p. 6.

The Georgia Approach: Working from the Objectives of Elementary Education

The Georgia model was developed by conceptualizing a desirable kind of elementary education and identifying the teacher performance which would be necessary to bring that kind of elementary education into existence.

To do this, the Georgia team began with the identification fo seven broad objectives of elementary schools. These in turn were used to determine the kinds of conditions that would be likely to lead students toward those objectives. From those conditions the teacher job analysis was made. (What should the teacher do to produce those conditions?) The job analysis was then broken down into specific teaching behaviors. For example, the following chart gives an example of the working procedures used to develop this performance analysis.[9]

Objective: To learn to solve problems.

Pupil Learning Behaviors

1. The child identifies problems.
2. The child formulates hypotheses.
3. The child gathers information.
4. The child analyzes data.
5. The child evaluates alternative solutions.
6. The child generalizes solutions.

Teaching Behaviors

1. The teacher organizes problem situations.
2. The teacher interests pupils in problem and observes its formulation.
3. The teacher observes information gathering and processing.
4. The teacher assists, as required, in developing a solution to the problem.

Suggested Specifications for Teacher Education Programs

A teacher education program will provide the student with:

1. Knowledge of and skill in developing problem situations.

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[9] University of Georgia. *Georgia Educational Model Specifications for the Preparation of Elementary Teachers* (OE 58019). Washington, D.C.: U.S. Office of Education, 1968, p. 37.

2. Knowledge of and skill in techniques of presenting problem solution methods.
3. Knowledge of and skill in critiquing problem solutions.

In the course of making this analysis, the Georgia team decided that no one kind of personnel could engage in all the behaviors that were being identified, and they were developed into four major categories for elementary school personnel: *aide, teaching assistant, certified elementary teacher, and specialist*. Each of the levels implied competence at the previous levels, and the four categories provided a career hierarchy for instructional personnel within the elementary school.

The Teachers College Model: A Teacher Innovator

Since so much of my own work went into the development of the Teachers College Model, I am reluctant to give it even an equal prominence in this paper, but the performance model we developed illustrates another type of procedure for facing the analytic problem with our present state of uncertainty about what the teacher should be and how he should perform.

We constructed a hypothetical model of the competencies that would be needed by a person whose primary functions would be to create and test new educational forms. We gave an especially heavy emphasis to the needs of the teacher to be an institution builder, or a creator of schools as well as to his needs as an instructor. Four aspects of competency were identified: *the teacher as interactor or instructor, the institution builder, the innovator, and the teacher scholar*. Our description of the institution builder is illustrative:[10]

1. *The Institution Builder (Shaper of the School)*. In this role the teacher-innovator works with other faculty members, community representatives, students, and administrators to design complete educational programs and organizational structures to bring them into existence. The shaper of the school controls strategies for studying and designing curricula systems; analyzing and creating effective social systems in the school; and assembling and employing technical support systems which facilitate education.

2. *The Interactive Teacher*. The most familiar teaching role occurs during contact with children. At that point the teacher needs strategies for making instructional decisions which are tailored to the characteristics and needs

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[10] Teachers College, Columbia University. *The Teacher-Innovator: A Program to Prepare Teachers* (OE 58021). Washington, D.C.: U.S. Office of Education, 1968, p. 23.

of the students. He can work with groups of children to build effective democratic structures through which they can conduct their education. He controls a wide variety of teaching strategies and a wide range of technological assists to education. He is a student of individual differences, and he has the interpersonal sensitivity to touch closely the minds and emotions of the students and is able to bring structure to chaotic situations without his colleagues. He rarely works alone, partly because he needs their colleagueship and the shared analysis of teaching and learning that is a continuous part of their professional life. With them he controls techniques for designing continual small experiments of teaching and learning.

It is interesting to note that, even with this approach, the Teachers College performance model shared many characteristics with the others. The interactive teacher was seen as a specifier of goals, and a controller of a wide range of teaching strategies that he could use to achieve many kinds of teaching purposes, a description very close to that given in the Comfield model, although the languages used were different as was the exact shape of the two models.

The University of Toledo Model: The Teacher as a Team Member

The Toledo group developed their performance model by describing a clinical team of teachers in action and by analyzing the functions of a team member:[11]

> *A New Role for the Elementary Teacher*. Simply stated, the prime functions of the teacher are the transmission of knowledge and the transmission of values. As previously mentioned, both cognitive knowledge and societal values and norms are becoming increasingly complex. When attempting to fulfill his task as a transmitter of values and norms, the teacher must not only mediate between the child's world and the adult in an effort to close the ever widening generation gap, but he must also deal with a serious cultural gap. The cultural gap is especially important when the student's cultural background is markedly different from the teacher's. When norms are in a state of flux, as in our attitudes toward sex and drugs, the teacher may not feel competent to force his values upon the pupils. When the teacher attempts to fulfill his function as a transmitter of knowledge, he is again caught in the web of rapid change. It seems clear that if the teacher is to fulfill these two functions successfully, he will need help.

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[11] University of Toledo. *Educational Specifications for a Comprehensive Elementary Teacher Education Program* (OE). Washington, D.C.: U.S. Office of Education, 1968, pp. 61-62.

The Teacher as a Team Member. If the elementary teacher is to maximize his effectiveness in the transmission of cognitive knowledge, he will need to be a member of a team--a team made up of specialists. The purpose of the team would be to design instructional systems. An instructional system is a strategic complex of human and nonhuman components which are dynamically interdependent and interrelated and work together to attain a particular instructional goal or set of goals. The instructional system receives inputs from the external environment, processes these inputs in a prescribed instructional environment according to strategies derived from research and expert opinion, so that the output generated will have a high probability of achieving the prescribed goal or goals. The instructional system components may include some or all of the following: learner(s), teacher(s), mediated instructional materials, assessment and feedback instruments, information processing and displaying machines, and support technician(s).

The key to this arrangement is the *team*. Instructional decisions are made cooperatively by a team of specialists with a master teacher serving in the role of instructional specialist throughout the entire instructional system design process. Each team could serve a number of master teachers. For example, in a building of 30 teachers and 900 pupils there could be six master teachers all of whom were served by the same Instructional System Design team.

The membership of the ISD team would vary depending upon the needs and background of the pupils, e.g., a slum school would probably need the services of at least one sociologist or an elementary school near Cape Kennedy might require a specialist in space technology in order to take advantage of the children's knowledge of space science which they learned at home. Some of the specialists that would very likely serve at all instructional systems design would be:

1. Subject matter specialist: to update the subject matter.
2. Curriculum specialist: to determine the mix of what to teach to whom.
3. Research specialist: to evaluate the instructional systems efficiency in terms of the output produced and to collect and feedback data needed to redesign the system; to calculate cost/effectiveness estimates of alternative instructional strategies and systems.
4. Educational sociologist: to interpret the social and cultural milieu of the child.

5. Educational psychologist: to study the child's growth and development and his individual learning patterns.

6. Instructional technologist: to design, develop, and test modules of mediated instruction.

7. Administrative specialist: to meet the administrative and managerial needs of the team.

8. Information management specialist: to develop information storage and retrieval systems, computer-based information management system, and computer simulation techniques.

9. Counseling and guidance specialist: to fulfill the guidance and counseling needs of the students through and with the help of the teachers.

10. Pupil evaluation specialist: to specify in behavioral terms the goals for each pupil, to assess the progress of each individual pupil and to make recommendations to the ISD team for modifications of the pupil's program.

The next step was to develop complete models of each of these roles and to fit them together again in a model of a smoothly functioning team.

The Michigan State Model: The Application of the Behavioral Sciences to Teaching

The Michigan State model gave the greatest emphasis to the teacher as an applied behavioral scientist. The teacher was seen as a scientist in the classroom, creating and testing hypotheses. The Michigan State team's description is directly to the point:[12]

> A key concept of the BSTEP model is *clinical behavior style*. The major function of this concept is to regularize the behavior of teachers. Clinical behavior style denotes those particular and stylized sets of activities and mental processes which a practitioner possesses. Such a practitioner of education will be specifically trained to utilize his client-related experience as the basis for continuous learning and

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[12] Michigan State University. *Behavioral Science Elementary Teacher Education Program* (OE 58024, two volumes). Washington, D.C.: U.S. Office of Education, 1968, p. 6.

improvement of his skills as a teacher. The clinical behavior style which is appropriate for a professional teacher consists of six phases: describing, analyzing, hypothesizing, prescribing, testing, and observing consequences. The last phase, observing consequences of the treatment administered, leads in turn, to the first by a process of recycling in order to describe the changed situation.

The progressional foundations of the program are centered on the behavioral sciences for two reasons: (a) the dominant task of all educational activity is to develop pupil behavior within various settings. The behavior sciences provide the systems of knowledge and inquiry most relatable to this task; (b) a distinctive feature of empirical science as a way of acquiring knowledge is that it is self-corrective.

The teacher was seen within this concept in terms of three processes: *proposing, doing, and reflecting*. He would identify problems, propose solutions to them, and reflect on the situation. Starting from this view of performance, the Michigan State team proceeded to identify the competencies needed to apply the behavioral sciences to the solution of educational problems. The total number of competencies reached more than 2,300 by the time the team had completed the work.

Performance Models: A Range Within a Common Approach

The foregoing should serve to indicate the behaviorism and clinical view of teaching common to the various models as well as the range of concepts used. The other model builders--Syracuse, Massachusetts, Florida State, and Wisconsin--shared many elements with the above. For example, the Wisconsin model described teacher "role orientations." One of these is in terms of decision-making, and the Wisconsin model is especially detailed with respect to competency within curriculum areas, as in the case of reading, science, mathematics, etc. The following example is drawn from the reading sequence. The several volumes of the Wisconsin model are filled with detailed analyses like the attached chart, describing decision-making behavior and interactive teaching behavior. The philosophical tone of the above example is typical--the teacher is seen as a reflective, philosophically aware behaviorist.

The Massachusetts model is structured so that the program can be adjusted to persons seeking a wide variety of specialties. Several types of competency are identified for each specialist and a profile of performance within each specialty. Each type of competency is organized in terms of a sequence of competencies so that students can enter each type at their level of achievement.

SUPPLEMENT II: IS KNOWLEDGEABLE ABOUT ASPECTS OF DEVELOPMENTAL PROGRAMS IN COMMUNICATION[13]

Knowledge	*Comprehension*	*Application*	*Analysis*	*Synthesis*	*Evaluation*
A. Knows the scope and varied sequence of behavioral outcomes desired when teaching each of the language processes to elementary pupils.	Comprehends the scope and varied sequence of behavioral outcomes desired when teaching each of the language processes to elementary pupils.	Lists and can define the scope and varied sequence of behavioral outcomes desired when teaching each of the communication processes to elementary pupils.	Classifies elements in the scope and varied sequence of behavioral outcomes desired when teaching each of the communication processes to elementary pupils.	Formulates the scope and varied sequence of behavioral outcomes desired when teaching each of the communication processes to elementary pupils.	Evaluates the appropriateness of scope and sequence of behavioral objectives in communication processes.

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[13] University of Wisconsin, Madison. *Wisconsin Elementary Teacher Education Project* (OE three volumes). Washington, D.C.: U.S. Office of Education, 1968, Vol. 3, p. 26.

There follows a figure from the Massachusetts report which is used for a profile analysis.[14]

In the Massachusetts profile analysis, profiles are constructed in several areas for each of several positions within differentiated teaching staffs. The entering student is matched with the desired profile for the particular specialty for which he is aiming, and the diagnosis that results can be used in planning his curriculum. As in the case of the other modular curricular designs, the Massachusetts model links specific learning objectives with instructional alternatives.

Nearly all the models, as mentioned previously, employed behavioral performance analysis to affective as well as cognitive and skill domains. An example from the Syracuse program shows a statement of educational objectives for a module relating to affective behavior.[15]

TTP-7: Educational Objectives for Affective Behavior

1. *Prerequisites:* Completion of TTP-5. Concurrent with tutorial experience in the public schools.

2. *Placement of Module:* Junior, preprofessional year.

3. *Estimated Time:* Student time--4 hours. University faculty time--0 hours. Clinical Professor and Clinical Teacher time--0 hours.

4. *Operational Objectives:* The purpose of this module is to develop the ability to discriminate between statements of personal involvement, attitudes, motivations, values, etc., and to write objectives for lessons and curricula which include these types of outcomes. The general objectives of this module should prepare the student to do the following:

    a. Recognize and discriminate between statements of educational goals describing the affective characteristics of children (as distinct from the other objectives already studied) as inferred from watching specific types of behaviors.

    b. Write and justify the appropriateness of statements concerning

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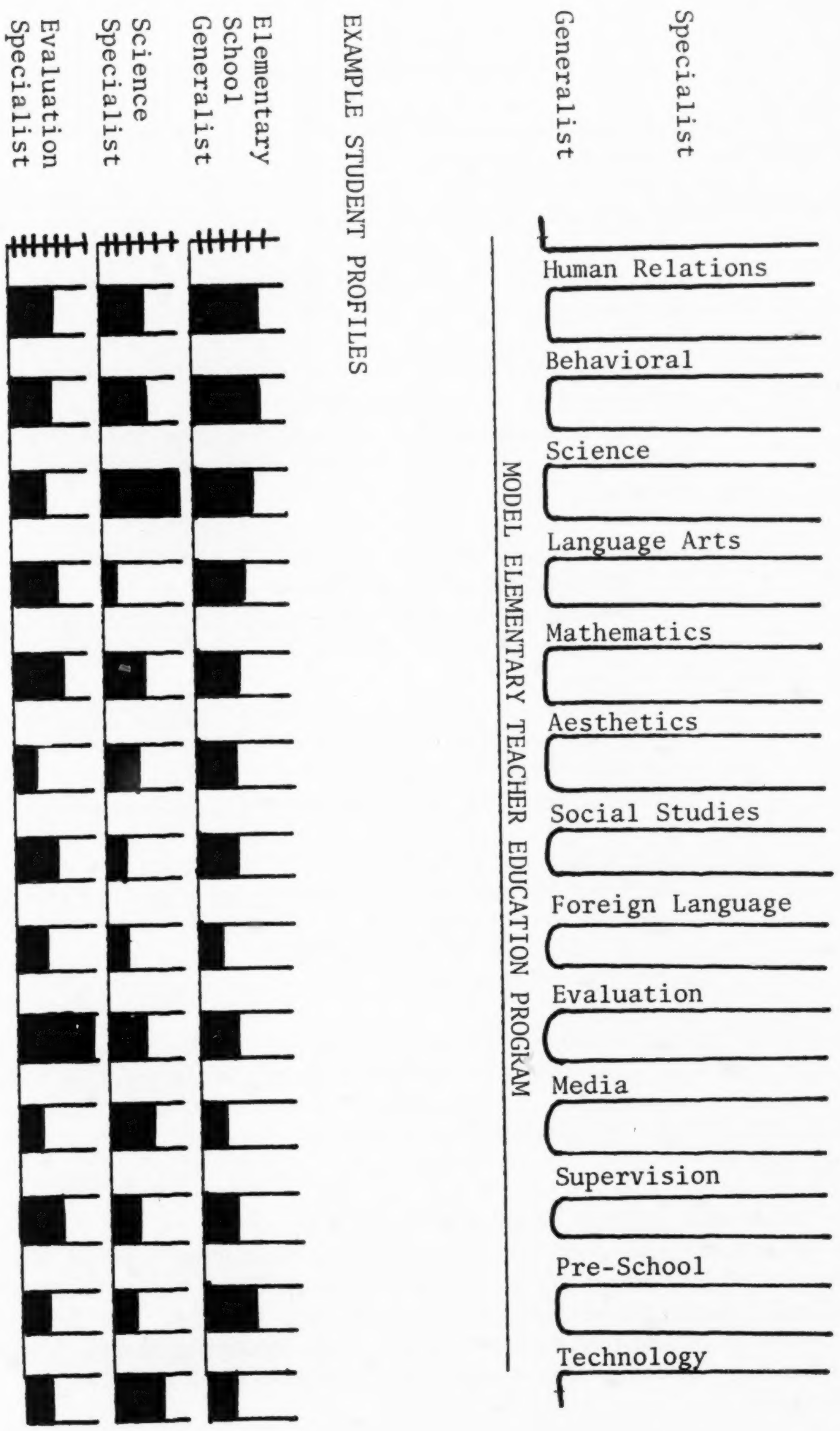
[14] University of Massachusetts. *Model Elementary Teacher Education Program* (OE 58024, two volumes). Washington, D.C.: U.S. Office of Education, 1968, p. 84.

[15] Syracuse University. *Specifications for a Comprehensive Undergraduate Pre-Service Teacher Education Program for Elementary Education* (OE 58016). Washington, D.C.: U.S. Office of Education, 1968, pp. 245-246.



UNIVERSITY OF MASSACHUSETTS PROFILE ANALYSIS the affective outcomes of lessons and curricula.

If these broad objectives are achieved, the student should, for example, be able to do the following:

1. When given a list of educational objectives, including the types of objectives studied in preceding modules and the different types and levels of affective behavior, be able to identify each and state the criteria for discriminating between them.

2. Given a case study description of an elementary classroom, including the characteristics of the pupils, be able to prepare a set of educational objectives for the class and individual pupils for at least three levels of affective involvement, such as:

   a. Being willing to attend to the stimuli of the situation.
   b. Responding when directed.
   c. Having consistency of self-initiated responses, at least within the limited regions of activity, etc.

3. Be able to relate a taxonomy of affective behavior to the various types and levels of attitudes (towards self, others, objects, and activities), motivations (affiliation, achievement, power, and avoidance of failure) interests, and values.

4. When asked to prepare a set of affective objectives for the child with whom he is working in a tutorial relationship, prepare objectives for at least three levels of pupil involvement. Justify the importance of these objectives for the child, school, and society.

This example shows not only a specie of behavioral analyses in the affective domain, but the emphasis on reflective thinking by the teacher that characterized most of the models. The behavioristic description of the teacher did not ordinarily imply a mechanistic-behaving teacher, but one with fluid, adaptable capability.

Although little attention is being given in this paper to the means of the programs, the complexity of the performance models obviously requires a complexity of component strategies which have to be integrated with the behaviors specified within the performance models. In several cases, a number of types of experience, activities, or learning modes (depending on the terminology used by the teams) were identified and linked to the specified behaviors.

In the Florida model, 16 types of student activities, or training experiences were combined in various ways in relation to particular objectives. The accompanying figure shows the code chart for the 16 activities; throughout the program the 16 activities are related in various ways in the subelements designed to produce particular types of competence.[16]

The range of activities is worth noting, and the number of them which are self-administering or in which the student is involved prominently is instructive. The high degree of student involvement is related to the desire to involve the teacher actively in his education and to link his preparation to the creation of the future.

Hence, both the activities and the performance criteria of all the models manifest a concern with an emerging future. The documents so frequently refer to the inadequacy of our present knowledge about how to educate children that you might suppose that the teams were obsessed with feelings of ignorance as they prepared the models. There was a determination to develop a teacher who would join in the battle against ignorance. He would act as a hypothesis-tester, as one who would propose objectives for students, who would define the conditions likely to achieve those objectives, who would bring about those conditions and evaluate the outcome--and then would set to work again on the basis of what he observed. Although the styles of specification varied greatly, the teacher was seen in all cases as a member of a clinical team which would use the tools of the behavioral sciences to clarify objectives and to generate theses about the kinds of conditions that would achieve them. As an evaluator, also, he was seen as a behaviorist, using the techniques of social science to attempt to determine the results of his efforts.

In the affective and human relations domains, the behavioral sciences were also very prominent. The teacher was seen as relating to other professionals, and it was assumed that it would be possible for him to receive the clinical training that would help him relate to others productively and that he would use knowledge from the behavioral sciences to guide his work with peers and community members as well as his students.

The teacher, then, was conceived as an applied scientist who would help create his field as well as practice on the basis of its present knowledge.

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[16] Florida State University. *A Model for the Preparation of Elementary Education Teachers* (OE 58018). Washington, D.C.: U.S. Office of Education, 1968, p. 18.

EXPERIENCES CODES
(From the Florida Model)

Individual Activities

Cmp	Computer Interaction
Int	Interview and Consultation
IS	Independent Study
LAV	Laboratory and Audio-Visual
Wr	Writing

Group Activities

Dsc	Discussion Group
Lct	Lecture
Prj	Project
Prs	Presentation

Field Observation

Ocl	Observation in Class
OO	Observation in Other Site

Simulation

SmO	Observing Simulated Situations
Smp	Producing Simulation

Teaching

Tcl	Classroom
Tsg	Small Group
Tt	Tutorial (One Student)

Implications for Teacher Education: Commonality and Variability in Models of Teachers

The developed performance models reflect an implicit consensus about the most productive roles for the teacher today:

1. As an applied scientist (one who helps find the answers) and a behaviorist.
2. As a team member (a colleague and a specialist).
3. As decision-maker and clinician (a strategist with a range of competencies).
4. As a change agent (and one whose personality can cope with change).

In other words, no one developed a fixed performance model of the teacher--he was seen as one emerging and growing with the times and his own development. All saw behavioristic modes of planning and training to function in the humane domains. In fact, all saw behaviorism as the best avenue to a more humanistic as well as a more efficient education for children and teachers alike.

Hence, all of these systems planning teams denied the familiar assertion that systems planning techniques and humanistic education are incompatible.

The wide range of approaches to the development of the performance models included:

1. Conceptions of individualized and personalized education (several models, with Pittsburgh giving this concept a major focus).
2. Conceptions of teachers as people who make educational decisions, implement them, and get results. (Comfield is most direct with this concept, but it is shared by all models to some extent).
3. Conceptions of teachers as changers of educational institutions. (Especially heavy emphasis was made by Syracuse and Massachusetts, with Teachers College giving its entire concept to an innovator, and Florida and Comfield providing linkages to schools through those especially committed to innovation.)
4. Conceptions of interpersonal and affective behavior.

This wide range (which appears widest upon close examination) belies the notion that systems planners tend to produce homogeneous concepts of goals and means. The products represent an especially wide range of alternative goals that can be used by second-generation planners to make available, within training problems, different conceptions of education and teacher education. A second-generation effort in this field can capitalize on the diversity represented here, and a map of alternative performance models should gradually emerge.

To gain a more complete picture of what a second-generation systems planning effort might look like requires a more complete examination of the products--especially the nature of the components and management systems--and this analysis will be left for a subsequent paper.

SYNTHESIS AND SUMMARY

Donald Haefele

The CETEM designers have increased the teacher educator's knowledge base and repertoire of skills by providing new ideas as well as generating strategies useful in program model design, development, and implementation. Teacher educators need systems techniques and strategies to make optimal use of the available ideas.

How could the application of a systems approach improve teacher preparation programs? There are several ways of responding.

First, let's consider the *general concept of system*. Howsam and LeBaron and Klatt supply definitions of "system." The latter two elaborate on the theory more fully. Banathy supplements definitions of "system" provided earlier: "interrelated and interacting components which are employed to function in an integrated fashion to attain predetermined purposes."[1] The dominant characteristic of the system is its purpose.

> The *purpose* of the system is realized through *processes* in which interacting *components* of the system engage in order to produce a predetermined output. Purpose determines the process required, and the process will imply the kinds of components that will make up the system.[2]

A system then has purpose, processes, and components. The purpose gives the system direction (objectives), thereby determining the processes (means) needed to achieve the purpose. Components (subsystems) which are implied by and determined from the processes function to achieve the purpose of the system. These three features--purpose, process, and components--furnish us with perspectives from which we can analyze and describe any existing system, or compose a better one. The "systems approach," then, is basically the application of such a systemic strategy, or analysis, to human endeavor.

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[1] Bela Banathy. *Instructional Systems*. Palo Alto: Fearon Publishing Co., 1968, p. 3.
[2] *Ibid.*, p. 12.

Some interesting comparisons emerge when one employs Banathy's *Purpose*→*Process*→*Component* paradigm to juxtapose current teacher preparation programs and the models. In general, most teacher education programs lack a clear statement of purpose(s). Comprehensive, explicit objectives are difficult to find in many programs; developing such goals demands more than the delineation of general goals. Research and/or theoretical bases likewise are missing in many existing traditional programs. In contrast, the CETEM's include quite comprehensive goals and objectives.

Presently, there is insufficient theory and research evidence to establish the validity of a number of the models' assumptions. This is not a serious deficiency in the models for two reasons. First, the models are experimental. No *model* has been sufficiently developed, implemented, and tested although some *components* are functioning now. As each model building team would agree, its product represents a first generation effort--rough and incomplete. The models collectively furnish a base on which to build improved stages of program research, development, and operation. Secondly, nearly all of the models incorporate sophisticated correctional provisions, that is, internal and external feedback mechanisms. These provisions monitor the function of all the elements, especially the preservice and inservice teacher behavior. Therefore, the models are not static or steady-state products. They continue to evolve in response to new theory formulation, hypothesis testing, and analysis of findings. Modifications seem likely as new theory and research are juxtaposed with the current assumptions, rationale, and objectives.

In general, present processes (programs or systems) for preservice teachers are not systematically linked to or derived from goals and objectives. While new approaches to preparing teachers--such as microteaching, interaction analysis, and simulation--have been incorporated into many programs, such experiences have usually been added to existing curricula without adequate concern for the entire process (or system). Our approach to change has tended to be the piecemeal-additive approach rather than a systems approach.

In contrast, the models' processes evolved from stated purpose(s). In one case, the Michigan State University Model, there is a module (instructional unit) built around each of some 2,700 specific objectives. Some of the curricular processes found in the models include: career choice, simulation, sensitivity training, and clinical analytic experiences. All the models provide first-generation specific objectives.

The general notions of systems thinking, as described by Banathy, are useful in analyzing teacher education programs. LeBaron and Klatt propose systemic approaches to aid the teacher educator. Other teacher educators sanction the use of systems approaches in the Department of Defense and in industry--where a physical product is the output--but doubt that beneficial results will accrue in teacher education--where the product is a professional teacher.

Popham reviews Oettinger's three conditions which must be satisfied before a systems approach is suitable in teacher education.[3] The conditions are:

1. The system's components must be independent, or "isolatable."
2. The system being studied must be one for which well-developed research and design tools exist.
3. The system's purpose must be clearly defined.

Relative to "one", Popham notes that the partitioning of education programs into subsystems is not a difficult task. Curriculum, administration, faculty, and other subsystems can be identified as subsystems in the teacher education system. Teacher education qualifies for Oettinger's first condition.

Examining condition three, Popham indicates that teacher education and the CETEM's appear to meet this requirement particularly well. The CETEM's describe in great detail and from several stances the goals of teacher education. The Ohio Model, for instance, specify approximately 800 objectives.

Popham claims that teacher education, and education in general, qualify only in part for condition two. Research and evaluation design techniques fall short of current needs. Summative research (comparing two or more conditions), Popham feels, is at a satisfactory level. However, in the domain of formative research (decision-making for program improvement), he asserts that there is a limitation of technological method. Nevertheless, program development can benefit from the application of system thinking.

Basic Questions

The CETEM's are descriptive models derived from the systems approach. They are descriptions of *comprehensive* elementary teacher preparation programs. LeBaron and Klatt present several useful criteria for critiquing these models. They provide five criteria which are converted below into questions, with other questions added. The latter, though limited, are added to provide varied stances to use in examining CETEM or other models--or an operational program for which no comprehensive model exists.

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[3] Anthony G. Oettinger. *Run, Computer, Run.* Cambridge, Massachusetts: Harvard University Press, 1969.

Is the model complete?

Are distinct relationships established between the general education and/or liberal arts sectors and the professional methods and foundations courses, elementary and secondary levels, and so forth? Are mutually beneficial partnerships with the local school system(s) proposed? Is emphasis placed on the affective domains of values, interests, and aesthetics as well as on cognitive development, skill proficiency, decision-making, and problem solving?

Does the model reflect an operational reality?

Does the program model reflect the true program? Is the program model realistic? Does it reflect societal trends and changes? Are the specified goals of the model realistic? Does the model of the teacher project an "omni-capable" individual? What conceptions of teaching does the model imply, attempt to induce, and directly or indirectly reinforce?

Is the model understandable?

Is the description of the model clear and adequate? Does the model furnish a simple illustration of the curricular sequence(s) a student would pursue? Are the components, processes, and their interrelationships portrayed in a logical and clear manner? Are purposes, processes, and components of the model consistent throughout?

Does the model encourage analysis?

Do the model and its separate components lend themselves to experimental research and evaluative study? Is the model adaptable for study in varied settings? Is it flexible? How does one assess the degree of flexibility in each model? Are the assumptions and objectives of the model valid? Are the graduate's competencies assessable? Can systematic and controlled analyses of the models be conducted to produce valid and reliable data?

Does the model encourage feedback?

Internal Feedback: Are the internal processes monitored? Are they functioning efficiently? Are component objectives being attained? Are the program experiences facilitating attainment of component and overall objectives? What is the faculty commitment to the model? What are the faculty's subjective and objective assessments of the model in operation?

External Feedback: Are external operations of the system monitored? What do data gathered from employing school systems indicate about the model? What is the assessment of the typical preservice teacher in student teaching, observation experiences, and intern experiences--by his supervising and cooperating teachers, principals, and other school and community people? Are decision-making strategies incorporated within the model? How well does the model measure up to accreditation standards? Many of these questions--and others which could be added--are quite general but useful in preliminary analyses.

In situations where constraints such as resources and time impose serious limitations on systemic efforts to improve programs, the faculty could proceed with some of the initial steps recommended by LeBaron and Klatt and by Cruickshank. Working within their familiar context, they could list the broad objectives, or goals, of the course(s) they teach. Student participation could be sought in these and successive tasks. Students could help to examine goals and objectives, supplement them delete some, and establish priorities from among the final collection. These objectives could then be converted into performance objectives, which specify the competencies students are expected to attain upon course completion. This is not a simple task, and it is a time consuming one.

Modules (short instructional units) can be designed to include one or more objectives. Examples of modules are abundant in the CETEM's. Development of instructional modules will often require funds, particularly if mediated materials (films, audiotapes, videotapes, etc.) have to be developed and/or purchased. Assuming success in the development phase, the modules should be field-tested and refined as needed.

The teacher educator's knowledge and skills should be enlisted in creative ways to lead in the development of a new program which affects him. Proper recognition and reward for such achievements should be forthcoming. Publishing companies in some cases could support the development of salable mediated packages.

Why develop a model?

There is value in the very process of program modeling, for it requires self-study. Self-study demands a continuing assessment of purpose, process, and product. Lacking a model, institutions may extend their resources and expertise in too many areas. A sense of consistency and continuity of effort and direction may be absent. A bad habit which is common when there is no model building is creeping curriculum inflation. This is characterized by a sustained addition of courses. Without a program model such occurrences frequently proceed unchecked.

A program model, and the requisite explication of goals, can furnish a reference for making curricular and tangential decisions. Of course, a model should be flexible enough to permit, when conditions are right, the skewing from balanced efforts toward greater effort in special areas, for example, development of protocol materials.

Modeling is characterized by a rigorous and permanent endeavor to collect and evaluate feedback data and adjust to the feedback demands. If the model is distinguished by continuing assessment provisions, the program will continue to be dynamic and always in the state-of-becoming.

APPENDIX:
ADDITIONAL AACTE-RELATED RESOURCES

Consultative Assistance

Consultants on the models and on the systems approach to teacher education can be secured from the AACTE Consultative Service for Teacher Education. Arrangements are tailored to each situation. They can be used as resource people in workshops, and they can assist staffs wherever pre- and in-service teacher education occurs. The Association has a number of audiovisual resources available for use by Association consultants.

Bibliography

1. *Analysis and Evaluation of Plans for Comprehensive Elementary Teacher Education Models/Final Report* (An AACTE Study)

   William E. Engbretson 1969 250 pages

   *ED 027 068 MF $1 HC $12.60

2. *A Reader's Guide to the Comprehensive Models for Preparing Elementary Teachers*

   Published jointly by AACTE and the ERIC Clearinghouse on Teacher Education

   Joel L. Burdin and Kaliopee Lanzillotti, editors

   1969 342 pages $4 (See ordering information for AACTE, pp. 102-103.)

3. *Comprehensive Proposals for Teacher Education: A Concise Guide Derived from Donald R. Cruickshank's Study of Proposals for Second-Phase Comprehensive Elementary Teacher Education Models*

   Includes a comprehensive bibliography of analytical, interpretive, and descriptive publications.

   Joel L. Burdin, compiler and editor

   1971 47 pages *ED 049 165 MF $.65 HC $3.29

4. *Elementary Teacher Education Models Analyzed in Relation to National Accreditation Standards*

   This publication is a cross-evaluation of the U. S. Office of Education Comprehensive Elementary Teacher Education Models Project, and the NCATE accreditation standards for teacher education developed by AACTE and used by the National Council for Accreditation of Teacher Education.

   Walt LeBaron 1970 14 pages *ED 041 857 MF $.65 HC $3.29

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